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DOE/MA-0274
Volume 4 of 4

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Congressional Budget Request

Clean Coal Technology
Fossil Energy Research and Development
Naval Petroleum and Oil Shale Reserves
Energy Conservation
Strategic Petroleum Reserves
Emergency Preparedness
Energy Regulation
Energy Information Administration

Volume 4

FY 1988

U.S. Department of Energy
Assistant Secretary,
Management and Administration
Office of the Controller

January 1987

DOE/MA-0274
Volume 4 of 4

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U.S. Department of Energy
Assistant Secretary,
Management and Administration
Office of the Controller
Washington, D.C. 20585

I

January 1987

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

CLEAN COAL TECHNOLOGY
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
NAVAL PETROLEUM AND OIL SHALE RESERVES
ENERGY CONSERVATION
STRATEGIC PETROLEUM RESERVES
EMERGENCY PREPAREDNESS
ENERGY REGULATION
ENERGY INFORMATION ADMINISTRATION

VOLUME 4

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DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1986 Actual BA	FY 1987 Estimate BA	FY 1988 Request BA
Appropriations Before The Energy and Water Development Subcommittees:			
Energy Supply Research and Development	$ 1,701,351	$ 1,254,131	$ 1,914,710
Uranium Enrichment	1,549,015	1,210,400	1,070,000
General Science and Research	659,059	719,517	814,498
Atomic Energy Defense Activities ..	7,292,405	7,481,852	8,050,000
Departmental Administration	235,676	139,509	166,133
Alaska Power Administration	3,245	2,881	3,026
Bonneville Power Administration ...	404,329	327,659	205,800
Southeastern Power Administration .	---	19,647	27,400
Southeastern - Continuing Fund	4,028	---	---
Southwestern Power Administration .	29,180	25,337	16,648
Western Area Power Administration .	195,842	240,309	295,515
Western Area Power Emergency Fund .	147	225	---
Federal Energy Regulatory Commission	45,107	-3,465	-900
Nuclear Waste Fund	499,037	499,000	500,000
Geothermal Resources Development Fund	69	72	72
Subtotal, Appropriations Before the Energy and Water Development Subcommittees	$12,618,490	$11,917,074	$13,062,902

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DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATIONS

BUDGET AUTHORITY IN THOUSANDS OF DOLLAR

	FY 1986 Actual BA	FY 1987 Estimate BA	FY 1988 Request BA
Appropriations Before Interior and Related Agencies Subcommittees:			
Alternative Fuels Production	$ 2,775	$ ---	$ ---
Clean Coal Technology	---	---	50,000
Fossil Energy Research and Development	309,389	251,402	168,900
Naval Petroleum and Oil Shale Reserves	13,002	122,177	159,700
Energy Conservation	426,187	149,679	86,090
Energy Regulation	23,423	23,400	21,680
Emergency Preparedness	5,750	6,044	6,206
Strategic Petroleum Reserve	107,533	147,433	270,181
Energy Information Activities	57,724	60,301	61,599
Subtotal, Interior and Related Agencies Subcommittees	945,783	760,436	824,356
Subtotal, Energy and Water Development Subcommittees	12,618,490	11,917,074	13,062,902
Subtotal, Department of Energy	13,564,273	12,677,510	13,887,258
Permanent - Indefinite Appropriations:			
Payments to States	629	705	727
Total, Department of Energy	$13,564,902	$12,678,215	$13,887,985

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1986 FTE USAGE	FY1987 -FY86	FY1987 CONGR REQ	FY1988 -FY87	FY1988 CONGR REQ
ENERGY & WATER SUBCOMMITTEE					
HEADQUARTERS	4,663	170	4,833	47	4,880
FIELD	9,393	62	9,455	-4	9,451
SUBCOMMITTEE TOTAL	14,056	232	14,288	43	14,331
INTERIOR SUBCOMMITTEE					
HEADQUARTERS	1,254	-13	1,241	-104	1,137
FIELD	883	5	888	-143	745
SUBCOMMITTEE TOTAL	2,137	-8	2,129	-247	1,882
GRAND TOTAL	16,193	224	16,417	-204	16,213
ADJUSTMENT		-317	-317	54	-263
ADJUSTED TOTAL	16,193	-93	16,100	-150	15,950

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DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL STAFFING REQUEST
TOTAL WORK FORCE

	FY1986 FTE USAGE	FY1987 -FY86	FY1987 CONGR REQ	FY1988 -FY87	FY1988 CONGR REQ
10:ENERGY SUPPLY RESEARCH AND DEV	918	8	926	0	926
HEADQUARTERS	635	4	639	0	639
FIELD	283	4	287	0	287
15:URANIUM ENRICHMENT	65	2	67	0	67
HEADQUARTERS	54	2	56	0	56
FIELD	11	0	11	0	11
20:GENERAL SCIENCE AND RESEARCH	38	1	39	0	39
HEADQUARTERS	38	1	39	0	39
25:ATOMIC ENERGY DEFENSE ACTIVITI	2,718	142	2,860	30	2,890
HEADQUARTERS	491	52	543	19	562
FIELD	2,227	90	2,317	11	2,328
30:DEPARTMENTAL ADMINISTRATION	3,273	77	3,350	20	3,370
HEADQUARTERS	1,693	46	1,739	5	1,744
FIELD	1,580	31	1,611	15	1,626
34:ALASKA POWER ADMINISTRATION	36	2	38	-3	35
FIELD	36	2	38	-3	35
36:BONNEVILLE POWER ADMIN	3,491	-61	3,430	-50	3,380
FIELD	3,491	-61	3,430	-50	3 380
38:SOUTHEASTERN POWER ADMIN	38	2	40	0	40
FIELD	38	2	40	0	40
42:SOUTHWESTERN POWER ADMIN	193	-7	186	0	186
FIELD	193	-7	186	0	186
46:WAPA - POWER MARKETING	1,176	-16	1,160	0	1,160
FIELD	1,176	-16	1,160	0	1,160
50:WAPA - COLORADO RIVER BASIN	219	0	219	0	219
FIELD	219	0	219	0	219
52:FEDERAL ENERGY REGULATORY COMM	1,597	62	1,659	0	1,659
HEADQUARTERS	1,597	62	1,659	0	1,659
54:NUCLEAR WASTE FUND	291	20	311	46	357
HEADQUARTERS	154	3	157	23	180
FIELD	137	17	154	23	177
56:GEOTHERMAL RESOURCES DEV FUND	1	0	1	0	1
HEADQUARTERS	1	0	1	0	1
65:FOSSIL ENERGY RESEARCH AND DEV	706	-3	703	-113	590
HEADQUARTERS	141	-3	138	0	138
FIELD	565	0	565	-113	452
70:NAVAL PETROL & OIL SHALE RES	99	-4	95	0	95
HEADQUARTERS	20	2	22	0	22
FIELD	79	-6	73	0	73
75:ENERGY CONSERVATION	322	30	352	-109	243
HEADQUARTERS	201	26	227	-84	143
FIELD	121	4	125	-25	100
80:EMERGENCY PREPAREDNESS	64	7	71	0	71
HEADQUARTERS	64	7	71	0	71
81:ECONOMIC REGULATION	348	-53	295	-20	275
HEADQUARTERS	348	-53	295	-20	275
85:STRATEGIC PETROLEUM RESERVE	152	-5	147	-5	142
HEADQUARTERS	34	-12	22	0	22
FIELD	118	7	125	-5	120
90:ENERGY INFORMATION ACTIVITIES	446	20	466	0	466
HEADQUARTERS	446	20	466	0	466
94:ADVANCES FOR CO-OP WORK	2	0	2	0	2
FIELD	2	0	2	0	2
GRAND TOTAL	16,193	224	16,417	-204	16,213
ADJUSTMENT		-317	-317	54	-263
ADJUSTED TOTAL	16,193	-93	16,100	-150	15,950

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CLEAN COAL TECHNOLOGY

[The Secretary of Energy pursuant to the Federal Non-nuclear Energy Research and Development Act of 1974 (Public Law 93-577), shall-

(1) no later than thirty days after the date of the enactment of this Act, publish in the Federal Register a notice soliciting statements of interest in, and informational proposals for, projects meeting the cost-sharing criteria contained under this head in Public Law 99-190 and employing emerging clean coal technologies which are capable of retrofitting, repowering, or modernizing existing facilities, which statements and informational proposals are to be submitted to the Secretary within sixty days after the publication of such notice; and

(2) no later than March 6, 1987, submit to Congress a summary report of statements of interest and infomational proposals received and no later than one hundred and twenty days after the receipt of such statements and proposals submit to Congress a report that analyzes the information contained in such statements informational proposals and assesses the potential usefulness and commercial viability of each emerging clean coal technology for which a statement of interest or informational proposal has been received.

Notwithstanding guidance provided by the Department in the February 17, 1986 Clean Coal Technology Program Opportunity Notice, funds expended by a priate sector participant during the period of Congressional review or approval of the projects selected by the Department for agreements may be eligible for cost-sharing, as appropriate, commencing immediately after a full and comprehensive report on the project in question is submitted to the Congress for a 30-day review pursuant to the Administrative Provisions of the Department of Energy in this Act: Provided, That such cost-sharing may only be reimbursed after the Congress has approved the project or the 30-day review period has elapsed and the agreement executed by the Department: Provided further, That in no case shall funds expended by the private sector during the review period be eligible for cost-sharing reimbursement of any project disapproved by the Congress.]

CLEAN COAL TECHNOLOGY

For necessary expenses, $50,000,000 to be derived from the Clean Coal Technology Reserve established pursuant to Public Law 98-473, to remain available until expended, for the Secretary of Energy to issue, pursuant to the Federal Nonnuclear Energy Research and Development Act of 1974 (Public Law 93-577), a general request for proposals for clean coal technology projects that (1) meet the cost-sharing criteria contained under this head in Public Law 99-190; (2) employ emerging clean coal technologies capable of retrofitting, repowering or modernizing existing facilities; and (3) satisfy the criteria provided in the "Joint Report of the Special Envoys on Acid Rain", dated January 1986, which is described in the Clean Coal Technology Program Announcement published in the Federal Register on November 12, 1986.

Further, to provide financial assistance awards for projects which meet said requirements in fiscal year 1989, $100,000,000, to be derived from the Clean Coal Technology Reserve, to remain available until expended. (Department of the Interior and Related Agencies Appropriations Act, 1987, as included in Public Laws 99-500 and 99-591, section 101(h).)

Explanation of Change

Deletes Language contained in Public Laws 99-500 and 99-591 which had specific application to Fiscal Year 1987.

Proposed Language provides an additional amount for a second Clean Coal Technology demonstration solicitation.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CLEAN COAL TECHNOLOGY

OVERVIEW

Clean Coal Technology Program

Background

Coal is the most abundant energy resource in the United States with recoverable reserves estimated to be 935 billion barrels crude oil equivalent (COE). However, petroleum and natural gas, whose proven reserves are estimated to be 28 billion barrels and 35 billion barrels COE respectively, are the most utilized fossil fuels in the U.S. energy consuming marketplace despite their significantly higher costs relative to coal. Even though oil and natural gas prices are projected to remain significantly higher than coal, their demand is expected to remain relatively the same as it was in 1984.

Coal is demand driven. The capacity exists to increase coal supplies to meet significant increases in demand. To make coal utilization look more attractive, the Department of Energy and the private sector have been conducting research through proof-of-concept on a wide variety of coal technologies aimed at improving the economics of using coal, improving the environmental performance associated with its use and converting coal into forms that could allow it to be used as a lower cost substitute for oil and natural gas. One of the principal activities in the area of improving environmental performance is the Clean Coal Technology program.

The Clean Coal Technology Program is related to, but not directly a continuation of, the effort that was undertaken by DOE pursuant to Section 321 of the "Act Making Continuing Appropriations for Fiscal Year 1985," P.L. 98-473, 98 Stat. 1874. Section 321 directed the Secretary of Energy to solicit from the private sector "statements of interest in, and proposals for projects employing emerging clean coal technologies," analyze the information received, and submit a report to Congress that "assesses the potential usefulness of each emerging clean coal technology... and ...identifies the extent to which federal incentives, including financial assistance, will accelerate the commercial availability of these technologies." In response to the November 27, 1984, Program Announcement, 49 Fed. Reg. 46696, DOE received one hundred and seventy-five submissions with project values totaling over $8 billion. On May 1, 1985, DOE submitted its findings in the "Report to Congress on Emerging Clean Coal Technologies" (DOE/S-0034).

In August 1985, the President signed into law H.R. 2577, "Making Supplemental Appropriations for the Fiscal Year Ending September 30, 1985, and for Other Purposes." The Conference Report 99-236 accompanying H.R. 2577 advised DOE to immediately begin the preparation of a competitive solicitation for cost-shared clean coal technology projects, to consult with the Environmental Protection Agency (EPA) on technologies traditionally supported by EPA and on environmental regulatory considerations, and provided guidelines for the preparation of the solicitation in addition to those cited earlier in the accompanying Senate Report 99-82.

On December 19, 1985, P.L. 99-190, "An Act Making Appropriations for the Department of the Interior and Related Agencies for the Fiscal Year Ending September 30, 1986, and for Other Purposes," was signed into law. This statute, among other things, provides funds to conduct cost-shared clean coal technology projects for the construction and operation of facilities that would demonstrate the feasibility of future commercial applications of such technology.

P.L. 99-190 makes available a total of $397.6 million for this program. These funds were distributed over a three year period as follows: $99.4 million in FY 1986, $149.1 million in FY 1987, and $149.1 million in FY 1988. Funding is provided from the $397.6 million for contracting, travel, and ancillary costs incurred by the Department of Energy for implementation of the Clean Coal Technology Program. P.L. 99-190 also requires a minimum of 50 per centum cost sharing by the private sector on each project, cost sharing in each phase of each project, constraints on valuation of "in-kind" cost sharing by the private sector, time limitations for issuing the solicitations, proposal preparation and project selection(s), among other things.

In accordance with the earlier guidance and P.L. 99-190 making funds available, the Clean Coal Technology program solicitation was issued on February 18, 1986, with a closing date of April 18, 1986. The proposals were evaluated and nine projects selected for negotiations on July 24, 1986.

The FY 1988 budget proposes an additional $350 million in spending over a five year period for new clean coal technology demonstrations to be at least 50 percent cost shared by participants. These demonstrations will be targeted to the recommendations of the Special Envoys Report. A second solicitation is anticipated for $150 million to provide financial assistance awards for projects that employ emerging clean coal technologies capable of retrofitting, repowering, or modernizing existing facilities. Specifically, $50 million is requested in FY 1988 for the second solicitation with an additional $100 million to be requested in FY 1989. The remaining $200 million is anticipated to be used on a third solicitation during the period of FY 1990-1992. This solicitation could also be aimed at retrofit, repowering or modernization of existing facilities that are presently burning high sulfur coal, but with the primary objective of reducing SO_2 and/or NO_x emissions. It should be noted that the $350 million is in addition to the $98,176,000 made available in FY 1986 and $149,100,000 made available in FY 1987 and 1988 which were to be used to support the first solicitation.

Program Goals and Objectives

The overall goal of the Clean Coal Technology Program is to conduct cost-shared construction and operation of clean coal technology projects to demonstrate the feasibility of future commercial applications of these technologies. When complete, it is expected that these demonstration projects will provide sufficient technical, economic, environmental, health and safety, and operational information at a large enough scale to enable the private sector to make rational commercialization decisions.

It is the intent of the Department to meet this goal in accord with the following program objectives:

- Implement the intent of Congress to advance the state-of-the-art in Clean Coal Technology by performing a competitive solicitation consistent with their guidance and to enter into cooperative agreements with selected representatives of the private sector to perform such co-funded projects as can be supported by the funds provided.
- Support the private sector in the execution of these projects as is required to achieve the objectives of Congress, the DOE and the private sector in the successful construction and operation of the selected concepts to demonstrate the feasibility of those concepts for future commercial application.
- Ensure that the maximum opportunity is created to achieve technology transfer and subsequent commercialization of these clean coal technologies by the private sector.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CLEAN COAL TECHNOLOGY
(dollars in thousands)

LEAD TABLE

Clean Coal Technology

	FY 1986	FY 1987	FY 1988	FY 1988	Request
	Actual	Appropriation	Base	Request	vs. Base
Clean Coal Technology	$ ...	$ ...	$ ...	$ 50,000	$+50,000
Clean Coal Technology (non-add)	(98,176)	(149,100)	(149,100)	(149,100)	...
Staffing (FTEs): Direct	0	0	0	0	0
Indirect	0	0[1]	0[1]	20	+20

1/ In FY 1987, the FTEs for Clean Coal Technology are included the Fossil Energy R&D indirect FTE total.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CLEAN COAL TECHNOLOGY
(dollars in thousands)

SUMMARY OF CHANGES

Clean Coal Technology

FY 1987 Appropriation enacted	$149,100
Cooperative Agreements	
o Provide for a second clean coal technology demonstration solicitation. The solicitation will focus on retrofit, repowering and modernization projects, utilizing the same policies and principles toward cost sharing as were adopted in the first clean coal technology solicitation and will seek to reduce information requirements were prudent	+47,746
Program Direction	
o Provide support for performing program solicitation, project selection and contract negotiations and initiate associated activity to produce and deliver such reports, evaluations, and overviews as may be required to describe, evaluate, monitor and manage the activities of the program in addition begin such preparation environmental work as may be needed to be responsive to NEPA requirements	+1,000
o Provide salaries, benefits, travel expenses, etc. for 20 FTE's associated with the Clean Coal Technology Program	+1,254
Subtotal	+2,254
FY 1988 Congressional Budget Request	$199,100

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CLEAN COAL TECHNOLOGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

CLEAN COAL TECHNOLOGY

I. Preface: Clean Coal Technology

The principal goal of this program is, as stated in P.L. 90-190, "for the purposes of conducting cost-shared clean coal technology projects for the construction and operation of facilities to demonstrate the feasibility of future commercial operation." It is targeted at a wide variety of market applications.

The FY 1988 budget proposes an additional $350 million in spending over a five year period for new clean coal technology demonstrations to be at least 50 percent cost shared by participants. These demonstrations will be targeted to the recommendations of the Special Envoys Report. A second solicitation is anticipated for $150 million to provide financial assistance awards for projects that employ emerging clean coal technologies capable of retrofitting, repowering, or modernizing existing facilities. Specifically, $50 million is requested in FY 1988 for the second solicitation with an additional $100 million to be requested in FY 1989. The remaining $200 million is anticipated to be used on a third solicitation during the period of FY 1990-1992. The second solicitation could be aimed at retrofit, repowering or modernization of existing facilities that are presently burning high sulfur coal. The objective of the third solicitation would be to reduce SO2 and/or NOx emissions. It should be noted that the $350 million is in addition to the $98,176,000 made available in FY 1986 and $149,100,000 made available in FY 1987 and 1988 which were to be used to support the first solicitation.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Cooperative Agreements	$96,685	$147,112	$194,858	+32
Program Direction	1,491	1,988	4,242	+113
Total, Clean Coal Technology	$98,176	$149,100	$199,100	+33

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
American Electric Power	$0	$14,000	$30,000
Babcock and Wilcox Company	$0	$800	$1,500
Energy and Environmental Research, Inc.	$0	$1,700	$2,300
Energy International	$0	$2,000	$5,000
General Electric Company	$0	$8,600	$40,000
Ohio-Ontario Clean Fuels	$0	$2,600	$7,200
Pullman Kellogg	$0	$18,000	$36,000
Wierton Steel	$0	$11,000	$27,000
Morgantown Energy Technology Center	$142	$1,100	$1,400

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Cooperative Agreements	Completed all activities of competitive solicitation and initiated negotiations with representatives of selected projects. ($71,685)	Completed contract negotiations and initiated design and construction efforts on facilities for selected projects. ($147,112)	Complete construction of all projects selected in first CCT solicitation and begin operational test program to produce data required. ($147,112)

III. Clean Coal Technology (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Cooperative Agreements (cont'd)	No activity. ($0)	No activity. ($0)	Prepare and issue a new solicitation for financial assistance that will focus on retrofit, repowering and modernization projects. ($47,746)
	Established cost overrun reserve fund. (25,000)	Continued activities related to cost overrun reserve fund utilizing prior year funding. ($0)	Continued activities related to cost overrun reserve fund utilizing prior year funding. ($0)
Program Direction	Provided support for performing program solicitation, project selection and contract negotiations. ($500)	Provided support for completing contract negotiations monitoring project design and construction effort. ($688)	Continue support of work in progress to complete construction phase and to implement operational programs for projects in first CCT soliciation. ($568)
	No activity. ($0)	No activity. ($0)	Provide required support for second CCT solicitation and subsequent selection of projects. ($200)
	Initiated activity to produce and deliver reports/evaluations/overviews as may be required. Initiated program status/assessments effort. ($450)	Completed and delivered reports required in program authorizing legislation and prepared such evaluations, status reviews, presentations as may be required. Continued assessments activity. ($680)	Continue to prepare such evaluations, status reports, presentations, etc. as may be required to describe the program and its progress to accomplishing its objectives. ($680)
	No activity. ($0)	No activity. ($0)	Initiate project, technology, market, etc. assessments required to evaluate and direct projects of second solicitation and to coordinate these projects within the CCT program to optimize the overall benefits of the effort. ($400)
	Initiated work on associated environmental assessment reports responsive to NEPA requirements. ($541)	Completed required assessment reports and initiated environmental monitoring activities. ($620)	Continue environmental assessment studies and operational monitoring programs for project selected in the initial CCT solicitation. ($740)

III. Clean Coal Technology (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Program Direction (cont'd)	No activity. ($0)	No activity. ($0)	Provide for salaries, benefits, travel expenses, etc. for 20 FTE's. ($1,254)
	No activity. ($0)	No activity. ($0)	Initiate environmental evaluation work on projects selected in second CCT solicitation needed to satisfy NEPA requirements. ($400)
Total, Clean Coal Technology	$98,176	$149,100	$199,100

IV. Construction Projects

- o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Clean Coal Technology

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ ...	$ ...	$ 1,031
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	...	...
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	...	...	1,031
12 Personnel benefits			
12.1 Civilian personnel	...	...	156
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	116	...	67
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	2	...	...
25 Other services	247	61,700	354,348
26 Supplies and materials	39	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$ 404	$61,700	$355,602

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

VOLUME 4

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FOSSIL ENERGY RESEARCH AND DEVELOPMENT

(INCLUDING TRANSFER OF FUNDS)

For necessary expenses in carrying out fossil energy research and development activities, under the authority of the Department of Energy Organization Act (Public Law 95-91), including the acquisition of interest, including defeasible and equitable interests in any real property or any facility or for plant or facility acquisition or expansion, [$295,866,000,] $162,400,000 to remain available until expended, of which [$221,000] $230,000 is for the functions of the Office of the Federal Inspector for the Alaska Natural Gas Transportation System established pursuant to the authority of Public Law 94-586 (90 Stat. 2908-2909), [$411,000 to be derived by transfer from unobligated balances in the "Permitting and enforcement" account of the Federal Inspector for the Alaska Gas Pipeline, and $2,074,000 to be derive by transfer from unobligated balances in the "Fossil energy construction" account, and in addition, $437,000] of which $500,000 to be derived by transfer from amounts derived from fees for guarantees of obligations collected pursuant to section 19 of the Federal Nonnuclear Energy Research and Development Act of 1974, as amended (42 U.S.C. 5919), and deposited in the "Energy security reserve" established by Public Law 96-126: Provided, That no part of the sum herein made available shall be used for the field testing of nuclear explosives in the recovery of oil and gas.

[Of the funds herein provided, $26,500,000 is for implementation of the June 1984 multiyear, cost-shared magnetohydrodynamics program targeted on proof-of-concept testing: Provided further, That 20 per centum private sector cash or in-kind contributions shall be required for obligations in fiscal year 1987, and for each each subsequent fiscal year's obligations private sector contributions shall increase by 5 per centum over the life of the proof-of-concept plan: Provided further, That existing facilities, equipment, and supplies, or previously expended research or development funds are not cost-sharing for the purposes of this appropriation, except as amortized, depreciated, or expensed in normal business practice: Provided further, That cost-sharing shall not be required for the costs of constructing or operating government-owned facilities or for the costs of Government organizations, National Laboratories, or universities and such costs shall not be used in calculating the required percentage for private sector contributions: Provided further, That private sector contribution percentages need not be met on each contract but must be met in total for each fiscal year.] (Department of the Interior and Related Agencies Appropriation Act, 1987, as included in Public Laws 99-500 and 99-591, section 101(h).)

Explanation of Change

Deletes Language contained in Public Laws 99-500 and 99-591 which had specific application to Fiscal Year 1987.

Deletes Language for the multi-year MHD development program because the cost of continuing the MHD program is not affordable in light of current fiscal constraints and therefore, no funds are requested for this program in FY 1988.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

AMOUNTS AVAILABLE FOR OBLIGATION

Fossil Energy

	FY 1987	FY 1988
Appropriation:		
Definite	$295,866	$161,900
Appropriation Total	$295,866	$161,900
Unobligated Balances:		
Start of year unobligated balances	$ 36,921	$ 0
Unobligated balances transferred to other appropriations	-588	0
Unobligated balances transferred from other appropriations	437	500
End of year unobligated balances	0	0
Recovery of prior year obligations	3,000	0
Total Obligations	$335,666	$162,400

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Request
COAL:			
Control Technology and Coal Preparation	$ 31,950	$ 37,826	$ 33,000
Advanced Research and Technology Development	33,849	32,387	26,000
Coal Liquefaction	31,620	24,107	9,500
Combustion Systems	29,113	15,142	21,600
Fuel Cells	34,057	28,084	5,200
Heat Engines and Heat Recovery	12,314	12,146	8,300
Underground Coal Gasification	4,072	2,370	---
Magnetohydrodynamics	27,717	26,500	---
Surface Coal Gasification	41,323	24,655	5,800
Subtotal, Coal	246,015	203,217	109,400
PETROLEUM:			
Advanced Process Technology	5,523	3,785	2,000
Enhanced Oil Recovery	11,454	11,211	9,300
Oil Shale	12,136	10,967	955
Subtotal, Petroleum	29,113	25,963	12,255
GAS:			
Unconventional Gas Recovery	8,503	8,009	1,600
Subtotal, Gas	8,503	8,009	1,600
POLICY AND MANAGEMENT:			
Headquarters Program Direction	10,815	14,283	10,835
ETC Program Direction	39,265	46,952	27,600
Federal Inspector for the Alaska Gas Pipeline	511	221	230
Capital Equipment	2,865	1,500	480
Construction	3,332	1,750	---
Subtotal, Policy and Management	56,788	64,706	39,145
COOPERATIVE VENTURE R&D POOLS	---	---	7,000
Subtotal, Fossil Energy	340,419	301,895	169,400
Use of Prior Year Balances and Other Adjustments	-31,030	-50,493	-500
Total, Fossil Energy R&D	$309,389	$251,402	$168,900

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT

OVERVIEW

Fossil Energy Research and Development

PRINCIPAL ISSUES IN FOSSIL ENERGY BETWEEN NOW AND 2000

Fossil fuels -- oil, natural gas and coal -- accounted for about 90 percent of the energy consumed in the United States during 1986, and will supply the majority of the Nation's energy needs well into the next century. Availability of these fuels is thus a major component of the national energy policy.

There is currently a significant imbalance between the consumption/resource ratio for conventionally produced gas and particularly oil versus that of more abundant domestic fuels, especially coal. Coal, accounting for over 80 percent of the estimated U.S. recoverable fossil reserves, contributes only some 23 percent of the energy consumption. Oil, the least abundant (and most critical) resource, constituting about 3 percent of U.S. estimated recoverable fossil fuel reserves, accounts for over 42 percent of consumption. If the vast U.S. unconventional gas, oil shale and peat resources are included, the imbalance becomes even more pronounced.

The imbalance described above could have potentially adverse future implications for U.S. energy stability and security. This is reflected in projections done for the U.S. Energy Information Administration's 1985 Annual Energy Outlook (published February 1986), which show gross oil imports in the "base case" reaching 50 percent of domestic liquid needs by 1995 due to the projected availability of moderately priced imports. However, all cases analyzed by EIA assume world oil prices considerably above the 1986 average, including the "high oil imports" case, where imports account for 60 percent of domestic consumption by 1995.

There are a number of sound business/economic reasons why industry is unlikely to make a rapid transition in fuel-use patterns; e.g., including the lack of practical technologies for utilizing non-petroleum fuels in certain sections, the existing infrastructure, and the high front-end costs and potential environmental impact associated with many non-petroleum technologies. The potentially slow pace of the shift away from heavy reliance on conventional sources of premium fuels is reflected in projections made for the National Energy Policy Plan (NEPP - published December 1985), which in the Reference Case for the year 2010 indicate oil and gas will supply 46 percent of total U.S. primary energy consumption (all fuels). A number of uncertainties exist, however, that make it difficult to estimate the pace of this shift, including: future price and availability of oil and gas from conventional resources (as illustrated by current reversal in world oil price trends); environmental performance requirements; technical, economic and environmental performance of new fossil and other competing technologies; future demand for different fuels, particularly if oil prices remain relatively low for an extended period; and other market parameters which may change significantly during the life of an investment.

Electricity generation is an important intermediate activity on the spectrum between energy producer and energy consumer. NEPP projects that significant additional generating capacity will be required to meet future demands, to replace obsolete facilities, and to provide for effective reserve margins. Based upon NEPP projections, coal use for electricity generation by the year 2000 could amount to 23 percent of total primary energy use, and 83 percent of total coal used domestically. All of this is projected to occur at the same time that environmental questions about coal mining and use continue to be of serious public concern. In terms of tonnages, consumption of coal to generate electricity is expected to grow from the present 694 million tons annually to some 1,059 million tons in the year 2000 - a 52 percent increase in 15 years. If coal is going to attain projected use levels for generating electricity, it is essential that improved technologies be developed to allow the use of coal in both new and existing power plants in an economically competitive and environmentally acceptable manner.

Fossil Energy Strategic Objectives

Administration policy and guidance, DOE mission statements, Congressional guidance and analyses of fossil fuel supply and utilization trends and issues, in addition to NEPP goals and objectives, provide the framework within which the Office of Fossil Energy R&D program has been developed. Included in this framework are the strategic objectives which follow, and, in effect, provide an indication of how FE programs are addressing the issues outlined earlier.

Recognizing the need to effect an orderly transition to greater utilization of the most abundant domestic fossil fuel resources, two complementary overall strategic objectives have been established for FE:

1. Increase the contribution of coal by improvements in environmental, technical, and economic performance and increase the number of areas of application and flexibility of use of coal-based systems.
2. Increase the effective resource base for premium gas and liquid fuels through enhanced resource recovery and/or production of liquid and gaseous fuel analogs from coal, shale, and tar sands.

The FE program pursues these strategic objectives through activities which identify research opportunities and conduct research in the extraction, processing, and utilization of domestic fossil fuel resources which are not being pursued by the private sector because of high-risk/long-term characteristics. This research offers substantial potential improvements in terms of enhanced liquid and gaseous fuel supply or reduced demand and/or improved efficiency, economics, or environmental protection. FE plans, coordinates, and carries out research to the extent necessary to establish proof-of-concept and to provide the essential information for the private sector to make process development and commercial plant deployment decisions.

There are other strategic objectives that cut across all of the fossil fuel R&D programs. One is that process/technology research will be coupled with the appropriate associated environmental research to economically manage environmental impacts of processing and using fossil fuels. The objective of this research is to characterize potential impacts and the performance of new and developmental systems in controlling these impacts so that more efficient solutions to environmental concerns are available on a schedule consistent with the development of advanced technology.

Another objective is that all process/technology research will be coupled to advanced research activities needed to improve the understanding of fundamental scientific and engineering mechanisms. They include fundamental research on physical, chemical and thermodynamic characteristics of fossil fuels and their derivatives, fluid phenomena, solids transport, multiphase flow, combustion, materials, instrumentation and analytical techniques, environmental sciences, geosciences, innovative concepts, coordination of international activities in Fossil Energy, and sponsoring long-term scientific coal research at universities.

Program Objectives

There are a number of program objectives listed below that apply to the research and development in Fossil Energy.

Coal:

- Foster development of economic methods for modifying the overall physical characteristics of coal (reduce ash and sulfur, but do not change state) to permit the resultant cleaned/modified coal to be used dry or as a slurry to permit utilization in a number of combustion systems.

- Identify and foster development of new processes and/or equipment that are capable of using coal directly or as modified fuel forms in such a way as to increase the efficiency in the use of the fuel, extend its applicability and/or allow for its substitution for oil or gas.

- Foster development of lower cost more environmentally-acceptable technologies for the generation of electricity from coal which can increase the flexibility of the utility industry to meet capacity expansion and replacement needs.

- Foster development of improved and more economic and environmentally acceptable technologies to allow coal to be converted (including both above ground and underground processes) into a gaseous fuel or synthesis gas suitable for the requirements of new as well as existing end uses.

- Foster development of economically attractive and environmentally acceptable technologies to allow coal to be converted (including both direct and indirect liquefaction) to a complete range of petroleum substitutes that can be used for transportation, industrial, utility, and chemical applications.
- Identify and foster development of new fuel forms that can be produced from coal (other than those cited above) as an energy source in existing or new energy conversion systems.

Oil:

- Foster development of economically attractive and environmentally acceptable technologies for improved reservoir definition and cost-effective extraction processes applicable to (1) enhanced light oil recovery, (2) in situ recovery by thermal and non-thermal techniques of heavy oil and tar sand bitumen, and (3) conversion of oil shale, all of which can add to the supplies of oil from conventional domestic sources.

Gas:

- Foster development of unconventional and novel natural gas resources which can add to the supplies of natural gas from conventional sources.

While these objectives provide the framework for most FE R&D activities, it should be noted that there are other activities that are performed within the context of the national energy goal and strategies. These activities, which reside in FE because of its management and technical experience/expertise include: general policy and strategic studies related to fossil energy; studies and analysis on fossil fuel transportation issues and certain energy supply aspects of leasing; management of the Liquefied Gaseous Fuels Spill Test Facility program to address safety issues associated with large spills; and support to federal agencies on fossil energy related matters.

Program Guidelines

In addition to the above program objectives, there are a number of guidelines and criteria that are observed in the planning and execution of FE programs. One such guideline is that an appropriate mix of research performing entities should be sought. The mix should include the activities necessary to sustain a core in-house institutional capability. It should also seek to sustain an appropriate infrastructure in fundamental and long-range, applied research on fossil fuels at universities, national laboratories, and in the private sector.

Regarding private sector participation, private sector input is solicited during the program planning process through a variety of mechanisms, including advisory groups, workshops and peer reviews. In the program execution phase, substantial emphasis is placed on cost-sharing to facilitate the transfer of technology to the private sector and to reduce federal expenditures. Inherent in this approach is an attempt to attract research performers that have a long-term institutional commitment to an area of research and to the ultimate application of the research results. In general, industry will be more willing to invest its money in potential high payoff R&D as risks and uncertainties are reduced, and thus cost-sharing frequently becomes more attractive as R&D approaches the proof-of-concept stage.

One of the primary goals of all the applied research areas in FE is to effectively transfer technology from Federal and university laboratories to private industry. The earlier industry is involved, and the more directly that the research agenda is guided by the companies' own economic self-interest, the more effective the transfer is likely to be. In FY 1987, FE proposed to initiate a new approach to cost-sharing known as cooperative R&D ventures. Based on input received at several regional, public meetings during the first part of FY 1987, FE intends to structure such a cooperative R&D ventures program. The details of the proposed program and funding request for FY 1988 will be included in a future budget amendment.

Many of the same factors that make participation with the U.S. private sector desirable have motivated FE to seek state and international cooperative efforts. The overriding concern is that any cooperative efforts must support FE program objectives.

FOSSIL ENERGY PROGRAM BUDGET

The levels of federal support in the budget for the various Fossil Energy technologies are believed to be appropriate given the need to progressively reduce Federal budget deficits, and when compared to the needs and to the levels of federal funding both for other energy related technologies and for other governmental activities.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

LEAD TABLE

Fossil Energy Research and Development

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Coal					
Control Technology and Coal Preparation	$ 31,950	$ 37,826	$ 37,826	$ 33,000	$ -4,826
Advanced Research and Technology Development	33,849	32,387	32,387	26,000	-6,387
Coal Liquefaction	31,620	24,107	24,107	9,500	-14,607
Combustion Systems	29,113	15,142	15,142	21,600	+6,458
Fuel Cells	34,057	28,084	28,084	5,200	-22,884
Heat Engines	12,314	12,146	12,146	8,300	-3,846
Underground Coal Gasification	4,072	2,370	2,370	...	-2,370
Magnetohydrodynamics	27,717	26,500	26,500	...	-26,500
Surface Coal Gasification	41,323	24,655	24,655	5,800	-18,855
Total Coal Operating Expenses	246,015	203,217	203,217	109,400	-93,817
Petroleum					
Advanced Process Technology	5,523	3,785	3,785	2,000	-1,785
Enhanced Oil Recovery	11,454	11,211	11,211	9,300	-1,911
Oil Shale	12,136	10,967	10,967	955	-10,012
Total Petroleum Operating Expenses	29,113	25,963	25,963	12,255	-13,708
Gas					
Unconventional Gas Recovery	8,503	8,009	8,009	1,600	-6,409
Total Gas Operating Expenses	8,503	8,009	8,009	1,600	-6,409
Program Direction and Management Support					
Headquarters Program Direction	10,815	14,283	14,283	10,835	-3,448
ETC Program Direction	39,265	46,952	46,952	27,600	-19,352
Federal Inspector for the Alaska Gas Pipeline	511	221	221	230	+9
Total Prog. Dir. & Mgmt. Supt. Operating Expenses	50,591	61,456	61,456	38,665	-22,791

Lead Table
Fossil Energy Research and Development (Cont'd)

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Plant and Capital Equipment					
Capital Equipment	$ 2,865	$ 1,500	$ 1,500	$ 480	$ -1,020
Construction	3,332	1,750	1,750	...	-1,750
Total Plant and Capital Equipment	6,197	3,250	3,250	480	-2,770
Subtotal Fossil Energy Research and Development	$340,419	$301,895 1/	$301,895 1/	$162,400	$-139,495
Use of Prior Year Balances and Other Adjustments	-31,030	-6,029	-6,029	-500	+5,529
Total Fossil Energy Research and Development	$309,389	$295,866	$295,866	$161,900	$-133,966
Operating Expenses	(311,422)	(294,690)	(294,690)	(161,420)	(-133,270)
Capital Equipment	(2,865)	(1,500)	(1,500)	(480)	(-1,020)
Construction	(-4,898)	(-324)	(-324)	(...)	(+324)
Staffing (FTEs): Direct	258	225	225	197	-28
Indirect	448	478	478	373	-105

1/ Of this amount, $44,464,000 is proposed for rescission.

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

COAL

VOLUME 4

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DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Control Technology and Coal Preparation

FY 1987 Appropriation enacted	$37,826
Coal Preparation	
o Maintain schedule and complete funding of contract to construct and test integrated Gravimelt system	+1,244
o Complete research on low rank coal in FY 1987 and reduce research on coal characterization and basic research on mechanisms in FY 1988. Continue technology base activities in the areas of physical and chemical cleaning, chemically modified coals, microbial desulfurization, ancillary operations, joint DOE/EPRI project, in-house research on coal cleaning and coal chemistry	-715
Subtotal	+529
Flue Gas Cleanup	
o Decrease level of effort for acid rain precursor control technology process candidates and boiler sorbent research	-2,501
o Increase advanced separation research	+1,552
o Complete Glo-Klen boiler tests in FY 1988	-1,100
o Initiate competitive procurements for research in the areas of SO_2 and NO_x removal at 3-5 MW scale and emissions control for small scale boilers	+3,341
o Complete research on boiler sorbents at UNDERC in FY 1987 and fluidized bed copper oxide test and evaluation in FY 1988. Reduce level of effort on advanced NO_x/SO_2 concept development and advanced NO_x control. Continue research on fine particulate control and enhanced mass transfer	-959
Subtotal	+333

Control Technology and Coal Preparation (cont'd)

Gas Stream Cleanup	
o Reduce PFBC and gasification particle control activity	-3,029
o Increase sulfur control activity in FY 1988 with funding for building and testing of the zinc ferrite system, novel sorbent kinetics and applied research	+1,472
o Increase trace contaminant control activity in FY 1988 with additional funding for halide effects on the molten carbonate fuel cell, ammonia absorption, and applied research. Decrease alkali control research in FY 1988	+267
o Continue calderon hot gas regenerative subsystem activity in FY 1988 with FY 1987 funds	-4,931
Subtotal	-6,221
Waste Management	
o Complete waste based material development and low rank coal research in FY 1987	-192
o Continue sampling and characterization of chemical species, multisite field monitoring of solid wastes, energy recovery for waste stabilization, and in-house supporting research	+562
o Initiate waste management systems analysis and planning activity	+163
Subtotal	+533
FY 1988 Congressional Budget Request	$33,000

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

COAL

I. Preface: Control Technology and Coal Preparation

The functional organization of this activity forms four logical subactivities--Coal Preparation, Flue Gas Cleanup, Gas Stream Cleanup, and Waste Management. Coal Preparation is directed toward the development of advanced coal cleaning technologies that will reduce the ash and sulfur content of U.S. coal so that the product can be formulated into a high quality fuel that could replace oil and/or gas and reduce environmental emissions of suspected acid rain precursors from coal-fired power plants in both new and retrofit applications. Research is conducted in three broad areas: (1) physical treatment and cleaning; (2) chemical/biological pretreatment and cleaning; and (3) engineering support and ancillary operations. Advanced techniques include selective coalescence, new froth flotation cells, dry electrostatic separation, molten caustic leaching, microbial desulfurization, fine coal grinding (or comminution), and fine coal dewatering. Flue Gas Cleanup addresses the removal of pollution causing contaminants from fossil fuel fired systems to meet current and projected environmental standards that could serve to limit the utilization of fossil fuels. Efforts will be focused on fundamental research for processes for the combined removal of NOx, SOx, and particulates, both for utility and industrial applications. Gas Stream Cleanup includes the technology for removal of contaminants from gasifier and combustor process streams prior to utilization in advanced power conversion cycles such as gas turbines and fuel cells. Both hardware and environmental protection are key concerns. Research is conducted in three major areas: (1) physical cleanup for coal based gas streams. Applications include pressurized fluidized bed (PFB) combustors, direct coal fueled turbines (DCFT), and fuel cells; (2) sulfur cleanup for coal based gas streams. Applications include PFB combustors, integrated gasifier combined cycle (IGCC) turbines, DCFTs, coal fueled diesels (CFD), and fuel cells; and (3) alkali and trace chemicals. Waste Management focuses primarily on waste sampling and characterization from coal preparation and emerging technology wastes.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Coal Preparation	$12,716	$10,953	$11,482	+5
Flue Gas Cleanup	10,952	12,897	13,230	+3
Gas Stream Cleanup	7,105	13,126	6,905	-47
Waste Management	1,177	850	1,383	+63
Total, Control Technology and Coal Preparation .	$31,950	$37,826 1/	$33,000	-13

1/ Of this amount, $6,995,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding (obligations)

Ames National Laboratory	$1,481	$1,330	$435
Pittsburgh Energy Technology Center	$2,724	$5,136	$4,968
Calderon Energy, Inc.	$0	$4,931	$0
Southern Illinois University	$1,432	$1,250	$0
TRW, Inc.	$1,320	$1,176	$2,244
UOP, Inc.	$2,598	$1,055	$1,081
New York University	$0	$1,000	$0
EG&G, Inc.	$918	$1,341	$1,568
General Electric Company	$400	$1,919	$514

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III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Coal Preparation	Completed testing of hot water drying PDU and low rank coal fine coal cleaning. ($96)	Completed research on advanced methods of low rank coal beneficiation at UNDERC. ($299) Of this amount, $265 is proposed for rescission.	No activity. ($0)
	Completed testing of Gravimelt and microwave 20 lb/hr bench scale reactors. ($1,922)	Completed design and began construction of Gravimelt integrated system. Completed modular tests. ($1,000)	Complete construction and testing of Gravimelt integrated system; begin operation runs with selected test coals to obtain data base information. ($2,244)
	Issued PRDA to investigate advanced concepts for chemically modified coals ($2,286). Identified microbes to remove organic sulfur from coal; initiated research on advanced physical cleaning techniques and completed testing of 1 ton/hr. ultrasonic comminution device along with fine coal dewatering basic research ($2,640). Initiated contract efforts on new microbubble flotation technology ($714). (Total $5,640)	Continued bench scale investigations and initiated new research on advanced concepts for chemically and physically cleaned coals and supporting research. Technology includes chemical and microbial techniques to remove organic sulfur, advanced flotation approaches to fine coal cleaning (total of $3,918 includes $2,012 in prior year funds for the chemically modified coal PRDA ($1,906)), chemical and electrochemical coal cleaning ($500), and advanced concepts in ancillary operations for fine coal cleaning ($1,050). (Total $3,456)	Continue promising research and explore new concepts for physical and chemical coal cleaning. Technology includes new flotation cells, selective agglomeration, chemical approaches to clean coal at low severity conditions, and microbial coal treatment ($3,745). Supporting research includes engineering evaluations and ancillary operations such as grinding, instrumentation and dewatering ($1,250). (Total $4,995)
	Continued joint DOE/EPRI advanced physical coal cleaning development and test program. Completed preparation for installation and testing of one advanced concept. ($538)	Continued joint DOE/EPRI advanced coal cleaning development and test program. ($1,500)	Continue DOE/EPRI testing of most promising advanced concepts for fine coal cleaning. Complete testing of initial units. Initiate preparations for testing additional concepts. ($2,000)
	Continued research activities at Southern Illinois Univ. (SIU). ($1,434)	Continued research activities at SIU. ($1,250) Of this amount, $1,000 is proposed for rescission.	Continue research activities at SIU through 12/31/87 using prior year funds. ($0)
	Continued coal cleaning research activities at Ames Lab. ($1,070)	Completed coal cleaning research activities at Ames Lab. ($1,140) Of this amount, $940 is proposed for rescission.	No activity. ($0)
	Continued in-house research on chemical/physical characteristics of ultrafine coal, beneficiation of chemically modified coals, organic sulfur chemistry and advanced concepts of physical/chemical coal cleaning technology. The concepts include selective agglomeration, true heavy liquid cycloning, and enhanced magnetic separation. ($2,016)	Continued in-house research on ultrafine coal characterization, fundamental organic sulfur chemistry, chemical and advanced physical cleaning concepts. Maintained a data system to assist in technology transfer. ($2,308)	Continue in-house research at laboratory scale to investigate and evaluate advanced physical and chemical coal cleaning concepts. Continue organic sulfur chemistry. Maintain a data base, characterize feed coal and coal cleaning products, and study the role of surface functional groups in coal treatment. ($2,243)

III. Control Technology and Coal Preparation (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Flue Gas Cleanup	Continued bench scale development of sorbents for boiler injection application. Work performed at UNDERC. ($439)	Completed development of improved boiler sorbents for western coal applications. Work performed at UNDERC. ($403) Of this amount, $357 is proposed for rescission.	No activity. ($0)
	Continued FY 85 PRDA and proof-of-concept (POC) test and evaluation for acid rain precursor control technology process candidates. ($1,797)	Completed POC test and evaluation for low temperature dry hydrate and dolomitic lime slurry induct injection for acid rain precursor control technology process candidates. Initiated research on TUNG scrubbing process. ($4,390)	Continue research for TUNG scrubbing process. Complete induct spray dryer process POC test and evaluation for acid rain precursor control. Conduct boiler sorbent research. ($2,389)
	Continued research on advanced NOx/SO2 chemistry and advanced concept development. ($4,456)	Continued research on advanced NOx/SO2 chemistry and bench scale advanced concept development. Conducted analysis and economic assessments and planning of selected promising concepts. ($2,094)	Continue research on advanced NOx/SO2 chemistry and bench scale advanced concept development. Conduct data base support and perform planning, studies and analysis of most promising concepts. ($1,425)
	Issued PRDA for advanced NOx control. ($0)	Initiated advanced NOx control research. ($500)	Continue advanced NOx control research. ($281)
	Issued PRDA for advanced separation technology. ($0)	Initiated research on advanced separation technology. ($1,500)	Continue research on advanced separation technology. ($3,052)
	Continued E-Beam/ammonia POC test and evaluation. Work performed by Ebara Corp. in Indiana. ($47)	Completed test and evaluation with prior year funds. ($0)	No activity. ($0)
	Continued fluidized bed copper oxide POC test and evaluation. ($2,778)	Continued fluidized bed copper oxide POC test and evaluation, including planning inputs, economic analysis and technical growth potential for improved cost and efficiency. ($1,810)	Complete fluidized bed copper oxide POC test and evaluation. ($1,463)
	Completed testing of Glo-Klen catalysts at lab scale using prior year funds. ($0)	Initiated large-scale boiler testing of Glo-Klen technology. ($1,100) The total funding of $1,100 is proposed for rescission.	Complete Glo-Klen boiler tests with prior year funds. ($0)
	No activity. ($0)	Initiated PRDA for high sulfur coal boiler sorbent development. ($500)	Continue high sulfur coal boiler sorbent development with prior year funds. ($0)
	Completed fine particulate control technology research. ($288)	No activity. ($0)	No activity. ($0)
	Continued dry scrubber evaluation at ANL in Illinois. ($1,147)	Completed dry scrubber evaluation at ANL with prior year funds. ($0)	No activity. ($0)

III. Control Technology and Coal Preparation (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Flue Gas Cleanup (Cont'd)	No activity. ($0)	No activity. ($0)	Initiate competitive procurement to scaleup most promising advanced flue gas processes for removal of SO2 and NOx at 3-5 MW scale. ($1,950)
	No activity. ($0)	Initiated competitive procurement for the capture of fine respirable particles from coal-fired boilers. ($500)	Continue research on the capture of fine respirable particles from coal-fired boilers. ($779)
	No activity. ($0)	No activity. ($0)	Initiate competitive procurement for emissions control (SO2, NOx, particulates) from small scale boilers. Conduct studies and attendant analysis of technical, economic and regulatory limitations. ($1,391)
	No activity. ($0)	Initiated PRDA to enhance mass transfer during induct injection. ($100)	Continue research on enhanced mass transfer between injected solids and flue gas by using novel enhancement methods. ($500)
Gas Stream Cleanup	Continued subpilot testing at NYU of candidate PFBC particulate removal devices; completed program definition phase for selecting cleanup devices for PFBC system integration POC testing ($1,457). Initiated direct coal fired turbine studies PRDA ($1,618). Initiated direct-fired turbines particulate removal tests ($192). Continued economic/system analysis for PFBC particle control systems. Work performed by Gilbert Commonwealth in Pa. ($75 of prior year funds). Completed lab/bench scale tests of second generation advanced PFBC particulate cleanup concepts ($391). (Total $3,658)	Continued NYU subpilot PFBC particle test ($1,224). Completed PRDA for direct coal fired turbine studies utilizing $1,600 of prior year funds. Continued process modification R&D for direct-fired turbines ($379). Initiated subpilot testing for gasifier particulate control devices; continued program development studies ($750). Of this amount, $650 is proposed for rescission. Initiated long term test of gasifier and PFBC particulate control devices ($650). Continued applied research for physical cleanup of gasifier and PFBC streams including instrumentation and control ($1,039). Of this amount, $325 is proposed for rescission. (Total $4,042)	Continue long term tests of PFBC concepts; continue R&D for direct coal fueled turbines (DCFT) concepts; continue fundamental and systems research for all applications, including instrumentation and control and program development studies. (Total $1,013)

III. Control Technology and Coal Preparation (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Gas Stream Cleanup (cont'd)	Determined concept feasibility of SO2 removal with selected sorbents ($288). Completed on-line tests for selected particulate and sulfur removal devices. Continued on-line coal gasifier tests of remaining selected particulate and sulfur removal devices ($883). Continued test and evaluation of soot, particulate control, and trace contaminants in support of MCFC ($331). Completed zinc ferrite sorbent testing at sub-pilot scale. Work performed by KRW in Pa. ($1,081). Completed experimental research on novel processes to treat regeneration tail gases from high temperature desulfurization of coal gases. ($90 of prior year funds). (Total $2,583)	Initiated fixed-bed desulfurization of regeneration tail gases by recycle to main gasifier ($1,005). The total funding of $1,005 is proposed for rescission. Initiated testing of gasifier H2S sulfur control device at bench scale ($700). The total funding of $700 is proposed for rescission. Continued R&D for sulfur removal with selected sorbents ($387). Continued applied research for sulfur cleanup of gasifier and direct coal-fired turbine; continued program development studies ($662). Of this amount, $58 is proposed for rescission. (Total $2,754)	Continue establishment of zinc ferrite absorption and regeneration parameters and demonstration of fixed and moving bed reactor concepts for integrated gasification combined cycle (IGCC); continue concept feasibility assessment for fuel cells, DCFT and coal fueled diesels (CFD); complete construction and initiate testing of fixed-bed desulfurization of regenerative tail gases by recycle to gasifier for absorption; continue investigation of novel sorbents; conduct program development studies; initiate combined sulfur/particle removal development; and initiate research on advanced concepts for sulfur removal. (Total $4,226)
	Completed subpilot scale alkali control tests for PFBC power systems at ANL and Westinghouse. Initiated alkali combustion chemistry research ($240). Continued research to resolve specific instrumentation problems; continued investigation of chemical and physical properties of contaminants ($85). Continued process modification control R&D for trace contaminants ($539). (Total $864)	Initiated alkali characterization of PFB combustor and simulated gasifier streams ($550). Of this amount, $425 is proposed for rescission. Continued alkali combustion chemistry research for PFBC ($481). Continued applied research for chemical cleanup ($148). Continued test and evaluation of soot, particulate control, and trace contaminants in support of MCFC ($130). Continued process modification R&D for trace contaminants ($90). (Total $1,399)	Continue to establish for all applications, chemistry of alkali species and intermediates formed in coal produced gas streams, to characterize streams from operating facilities for alkali level and phase, and to test activated bauxite for alkali control; integrate results from R&D into continuing lab work to establish the formation chemistry and identify control concepts for trace species such as ammonia, chloride, arsenic, heavy metals and other precursors to pollutants or degenerates; conduct program development studies; and initiate research on advanced concepts for trace chemical removal. (Total $1,666)
	No activity. ($0)	Initiated feasibility demonstration of Calderon hot gas regenerative subsystem. ($4,931)	Continue development using prior year funds. ($0)
Waste Management	Completed initial phase of waste management laboratory R&D of coal wastes. ($77)	Characterized low rank coal waste and developed waste based lining materials at UNDERC. ($192) Of this amount, $170 is proposed for rescission.	No activity. ($0)

III. Control Technology and Coal Preparation (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Waste Management (cont'd)	Continued sampling and characterization of chemical species in solid wastes and supported research on extracting energy from coal preparation wastes ($500). Continued adsorption and degradation studies of polynuclear (PAH) compounds in soil, and identification and establishment of multi-sites for monitoring leachates and behavior of solid wastes from advanced coal technologies ($275). (Total $775)	Continued sampling and characterization of organic and inorganic compounds in solid wastes and energy recovery from coal preparation wastes ($171). Completed studies of degradation of PAH compounds in soil with prior year funding; continued multi-year, multi-site field monitoring of solid wastes ($300). (Total $471)	Continue contracted efforts for sampling and characterization of organic and inorganic compounds in solid wastes, and energy recovery for waste stablization ($185). Continue multi-site field monitoring of solid wastes generated by advanced energy technologies and initiate waste management systems analysis and planning ($1,003). (Total $1,188)
	Continued in-house activities in supporting research and development of a waste management data base. ($325)	Continued in-house supporting research and data acquisition for waste management technologies. ($187)	Continue in-house activities on solid waste data base and supporting research. ($195)
Total, Control Tech. & Coal Preparation	$31,950	$37,826	$33,000

IV. Construction Projects

- o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Advanced Research and Technology Development

FY 1987 Appropriation enacted	$32,387
Direct Utilization	
o Decrease determination of properties of coal combustion fuel and product constituents; reduce research in atmospheric and pressurized combustion environments; reduce research on deposition and erosion mechanisms; increase research on separations processes related to coal beneficiation and pollutant control; continue generic and novel concept electro-chemistry research	-1,645
Materials and Components	
o Materials - Reduce level of fundamental research in the area of corrosion and erosion, ceramic development and alloy development	-1,723
o Components - Eliminate research on novel flow control devices; decrease fundamental research in bulk solids flow and in multiphase flow	-359
Subtotal	-2,082
Technology Crosscut	
o Environmental Activities - Increase emphasis on data base and analytical work applicable to fossil fuel/air quality issues	+143
o Technology Base Synthesis - Decrease analyses and studies to integrate research activities; decrease seed funding for new research initiatives; transfer (at reduced level) research on coal bioprocessing to Bioprocessing of Coal Subprogram	-1,200
o Instrumentation, Control and Diagnostics - Reduce research on flow instrumentation and constituent identification	-473

Advanced Research and Technology Development (Cont'd)

Technology Crosscut (Cont'd)

o Technical and Economical Analyses - Increased emphasis on studies examining the role of advanced fossil energy technologies across important end-use sectors, especially the industrial sector	+170
o Bioprocessing of coal - Continue, at reduced level, research on mechanisms of bioprocessing of coal	+200
Subtotal	-1,160
University/National Laboratory Coal Research	
o University Coal Research - Decrease the number of grants by eight (8) that can be awarded for fundamental coal research at universities	-1,900
o University/National Cooperative Program - Continue joint national laboratory/university research program	+400
Subtotal	-1,500
FY 1988 Congressional Budget Request	$26,000

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

COAL

I. Preface: Advanced Research and Technology Development

The Advanced Research and Technology Development Program is directed toward the scientific and technical areas that underlie the development of all fossil energy technologies. The AR&TD coal science program focuses on mission-oriented fundamental research to increase understanding of the mechanisms of coal combustion and conversion. The AR&TD program includes generic studies of materials and components and investigations of instrumentation concepts in environments associated with advanced coal technologies. AR&TD differs from the Fossil Energy line programs; the latter have an end-item technology development orientation while AR&TD's mission is to pursue generic research in support of all Fossil Energy coal line programs. AR&TD addresses fundamental scientific and engineering problems that are barriers to Fossil Energy technological goals. The AR&TD program is unique in that it is directed to specific scientific and technical areas which are closely connected to long-range Fossil Energy objectives.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Direct Utilization	$11,262	$10,645	$9,000	-15
Materials and Components:				
Materials	6,899	6,803	5,080	-25
Components	2,735	1,719	1,360	-21
Subtotal, Materials and Components	9,634	8,522	6,440	-24
Technology Crosscut:				
Environmental Activities	2,345	2,257	2,400	+06
Technical and Economic Analyses	2,151	2,000	2,170	+08
Technology Base Synthesis	779	800	600	-25
Instrumentation, Control and Diagnostics	2,056	1,663	1,190	-28
Bioprocessing of Coal	0	1,000	200	-80
Subtotal, Technology Crosscut	7,331	7,720	6,560	-15
University/National Laboratory Coal Research:				
University Coal Research	5,622	5,500	3,600	-35
University/National Laboratory Cooperative Program	0	0	400	+100
Subtotal, University/National Laboratory Coal Research	5,622	5,500	4,000	-27
Total, Advanced Research and Technology Development	$33,849	$32,387 1/	$26,000	-20

1/ Of this amount, $612,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
Sandia National Laboratories	$1,558	$1,255	$930
Argonne National Laboratory	$4,269	$3,339	$2,415
Idaho National Engineering Laboratory	$1,644	$1,300	$800
Oak Ridge National Laboratory	$4,670	$2,025	$1,950
Pittsburgh Energy Technology Center	$745	$1,419	$1,120

Advanced Research and Technology Development (Cont'd)

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Direct Utilization	Performed research on the determination of physical and chemical properties of uncombusted coal-based fuels, and of solid, liquid and gaseous products produced during the combustion process. ($769)	Continued research on the determination of physical and chemical properties of uncombusted coals and combustion products. Includes in-house research performed at PETC. ($702)	Conduct fundamental research in coal properties including work on physical and chemical properties of uncombusted coal based fuels, and of solid, liquid and gaseous products produced during the combustion process pertaining to coal. Includes in-house research performed at PETC. ($636)
	Performed research in combustion science, including investigation of fuel injection, atomization, devolatilization, pyrolysis, and oxidation; formation and transformation of pollutants (e.g., ash, sulfur and nitrogen compounds) and mass and energy transport; supported IEA-sponsored coal combustion science initiative. ($5,131)	Conducted research on coal combustion science. Continued support of IEA coal combustion science program. Included in the total funding is $533 for efforts performed by UNDERC. Includes in-house research performed at METC and PETC. ($5,314) Of this amount, $512 for UNDERC is proposed for rescission.	Support pulverized coal combustion research including work on coal devolatilization, radiant heat transfer in flames, and intra-combustor contaminant behavior. Support the IEA coal combustion science program. Includes in-house research performed by METC and PETC. ($3,331)
	Conducted studies on deposition mechanisms before, during, and after combustion, with particular emphasis on ash, mineral matter, and alkalies in conventional and fluidized bed boiler, diesel engine, and gas turbine applications. ($2,353)	Continued research on deposition mechanisms and erosion caused by mineral matter in atmospheric, internal combustion, and pressurized environments. Included in the total funding is $100 for work performed by UNDERC. Includes in-house research performed at METC and PETC. ($2,117) Of this amount, $100 for UNDERC is proposed for rescission.	Perform deposition research pertinent to slagging and fouling of boilers, fluidized bed heat exchanger tube wastage and pressurized and internal combustion environments. Includes in-house research performed by METC and PETC. ($1,770)
	Performed research on processes relevant to coal beneficiation (e.g., comminution, extraction of sulfur, mineral matter, nitrogen and alkalies) and the control and removal of pollutants during and after combustion. ($1,793)	Performed research on separation mechanisms relevant to the coal fuel cycle, from coal beneficiation to the removal of environmentally deleterious products of combustion. Includes in-house research performed at METC and PETC. ($1,162)	Increase coal beneficiation research and studies of contaminant removal during the combustion process. Continue contaminant removal research in hot gas streams. Increase fundamental surface science investigations with particular emphasis on separation of acid rain precursors. Includes in-house research performed by METC and PETC. ($1,886)
	Performed generic electrochemistry research and conducted fundamental studies pertinent to molten carbonate and solid oxide fuel cells. ($1,216)	Conducted generic electrochemistry research and research on fundamental aspects of molten carbonate and solid oxide fuel cells. Initiated new study of advanced novel fuel cell concepts. ($1,350)	Support generic electrochemistry research. Continue research on fundamental aspects of molten carbonate and solid oxide fuel cells and novel concept study. ($1,377)

III. Advanced Research and Technology Development (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Materials	Conducted research on high temperature corrosion, erosion, joining and mechanical properties of heat exchanger materials; maintained a consistent level of effort on corrosion, erosion, and mechanical properties of structural ceramics and refractories. ($6,899)	Conducted mechanistic research necessary to allow development and use of new corrosion and erosion resistant alloys, ceramics and refractories for use in coal conversion and utilization systems. ($6,803)	Conduct research on alloys, mechanisms of erosion and corrosion, ceramics composites, and techniques for consolidation and joining of advanced aluminides. ($5,080)
Components	Continued assessment of unique flow control concepts that reduce erosion. Initiated four new projects on high temperature seals, fluidic devices, nozzle development and moisture effects in coal feeding. ($1,139)	Continued efforts initiated in FY 85 and FY 86 on unique flow control concepts, fluidic devices, nozzle development, and ceramic seals. ($719)	Fund two projects (fluidic devices and nozzle development) that support coal-fueled systems. Eliminate research on novel flow control devices. ($540)
	Increased fundamental research in solids transport. ($1,596)	Continued fundamental research on bulk flow modeling, solids-liquid rheology, and dense phase solids-gas flow. ($1,000)	Continue fundamental research on solids transport. This consists of theoretical analyses of bulk flow, limited modeling and experimentation in solids-liquid flow, and preliminary research in dense phase pneumatic transport of solids. ($820)
Environmental Activities	Conducted analysis associated with air and water quality, solid waste disposal, toxic substances; supported occupational health and safety compliance services. ($1,645)	Continued analyses of issues associated with air and water quality, solid waste disposal, and toxic substances; continued support of occupational health and safety compliance services as well as $57 for UNDERC cooperative efforts. ($1,507)	Continue analyses of issues associated with air and water quality, solid waste disposal, and toxic substances. Continue support of occupational health and safety compliances services. ($1,650)
	Continued research conducted by ITFAP. ($700)	Continued research conducted under ITFAP with reduced emphasis on quality assurance of data and analytical tools. ($750)	Continue research conducted under NAPAP with emphasis on quality assurance of data and analytical tools. ($750)
Technical and Economic Analyses	Continued funding studies which support multi-year planning and FE strategy and program formulation, technical/economic assessment studies that crosscut a number of FE programs, and support of IEA/Coal Research Service. ($2,151)	Continued studies which support multi-year planning and FE strategy and program formulation, technical/economic assessment studies that crosscut a number of FE programs, and support of IEA/Coal Research Service. ($2,000)	Continue studies supporting multi-year planning, FE strategy and program formulation; conduct contract studies that crosscut a number of FE programs, fund IEA activities. ($2,170)
Technology Base Synthesis	Continued analyses, studies and technical evaluations in support of FE international activities; provided seed funding for new initiatives; identified advanced research needs. ($779)	Continued analyses and studies to integrate and coordinate research and exploratory development activities, to identify advanced research needs, to support international collaborative research activities in FE, and to provide seed funding for new advanced research initiatives. ($800)	Initiate studies to insure research is correctly focused and addresses needs of fossil energy technologies. This would include identifying areas of overlapping research, etc. Continue or initiate crosscutting advanced research projects of a multidisciplinary nature. ($600)

III. Advanced Research and Technology Development (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Instrumentation, Control and Diagnostics	Explored unique methods for measuring multiphase flow parameters such as velocity, solids content, and viscosity; and for identifying chemical species such as plasma spectrographic techniques. ($2,056)	Continued research on unique methods for measuring multiphase flow parameters such as velocity, solids content, and viscosity; and for identifying chemical species such as plasma spectrographic techniques. Includes in-house research performed by METC. ($1,663)	Undertake studies to measure acoustic parameters of fluids for applications to multiphase flow. Reduce basic research into laser-based chemical species analysis and solid state sensor probes and the investigation of fiber optic sensors as a means to probe high-temperature coal conversion environments. Includes in-house research performed by METC. ($1,190)
Bioprocessing of Coal	No Activity. ($0)	Expanded studies on biological processing of coal at INEL. ($1,000)	Conduct fundamental research in the bioprocessing of coal to gain an understanding of the biochemical mechanisms involved in coal desulfurization, liquefaction and gasification using microorganisms. ($200)
University Coal Research	Initiated approximately 30 new university projects in coal science, environmental science, surface science, advanced process concepts, reaction chemistry, thermodynamics and engineering fundamentals related to gasification, liquefaction and combustion of coal. ($5,622)	Initiated approximately 28 new university projects in coal science, environmental science, surface science, advanced process concepts, reaction chemistry, thermodynamics and engineering fundamentals to gasification, liquefaction and combustion of coal; encourage collaboration between university and industrial researchers. ($5,500)	Initiate approximately 20 new university projects on a variety of research topics including coal science, reaction chemistry, surface science, advanced process concepts, thermodynamics, engineering fundamentals, and environmental science; continue encouragement of collaboration between university and industrial researchers. ($3,600)
Univ./National Laboratory Cooperative Program	No Activity. ($0)	No activity. ($0)	Initiate one joint project involving collaboration of a national laboratory with universities in an area such as catalyst research, biotechnology, or combustion. ($400)
Total, Advanced Research and Technology Development	$33,849	$32,387	$26,000

IV. Construction Projects

- None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Coal Liquefaction

FY 1987 Appropriation enacted	$24,107
Advanced Research	
o Decreased research on: novel catalytic, biological, and other approaches to coal liquefaction; improved understanding of liquefaction processes; and physical, chemical and thermodynamic properties of fossil fuel liquids	-1,551
Direct Liquefaction	
o Completed proof-of-concept testing at Wilsonville	-7,000
o Eliminated low rank coal research at University of North Dakota Energy Research Center	-794
o Reduced in-house research at PETC	-375
o Reduced cost shared industrial bench scale research	-751
Subtotal	-8,920
Indirect Liquefaction	
o Completed liquid phase methanol process development unit testing at LaPorte, TX	-2,300
o Reduced in house research at PETC	-450
o Reduced cost shared industrial bench scale research	-984
Subtotal	-3,734

Coal Liquefaction (Cont'd)

Support Studies and Engineering Evaluations

o Eliminated data base acquisition and evaluation activities	-402
FY 1982 Congressional Budget Request	$9,500

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

COAL

I. Preface: Coal Liquefaction

The need for liquid fuels is forecast to be a persistent and critical element of this nation's energy future through this century. The Coal Liquefaction program supports basic and applied research to develop the scientific and engineering knowledge base with which industry can bring economically competitive and environmentally acceptable advanced technology for the manufacture of synthetic liquid fuels from coal into the marketplace when needed. Coal liquefaction produces a complete spectrum of liquid fuels which will be utilized in the existing infrastructure. The Department's efforts are focused upon the two different and distinct approaches to producing liquid fuels from coal, direct liquefaction, and indirect liquefaction. Direct liquefaction processes convert the complex organic chemical structures found in coal directly to liquid components by hydrogenation. Indirect liquefaction involves coal gasification to produce synthesis gas (a mixture of CO + H2) followed by the catalytic conversion of the synthesis gas to liquids. Each of these approaches has unique characteristics that make it a candidate for commercial development when market conditions are appropriate.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Advanced Research	$5,157	$4,541	$2,990	-34
Indirect Liquefaction	9,325	6,264	2,530	-60
Direct Liquefaction	12,807	11,910	2,990	-75
Support Studies/Engineering Evaluations	4,331	1,392	990	-29
Total, Coal Liquefaction	$31,620	$24,107 1/	$9,500	-61

1/ Of this amount, $7,469,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding (obligations)

Sandia National Laboratories	$1,663	$1,686	$1,370
Hydrocarbon Research, Inc.	$2,200	$1,051	$0
Pittsburgh Energy Technology Center	$3,743	$2,738	$1,525
Wilsonville Advanced Coal Liquefaction Facility	$6,440	$7,000	$0
LaPorte Liquid Phase Methanol Process Development Unit	$330	$7,150	$0
University of North Dakota Energy Research Center	$1,027	$1,153	$0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Advanced Research	Continued exploration of innovative coal liquefaction process concepts. ($1,201)	Continued exploratory efforts on novel coal liquefaction processes, including exploratory research on methods for solubilization of coal under mild conditions of temperature, pressure and/or reaction time. Included in-house research performed at PETC. ($614)	Continue exploratory efforts on improving novel coal liquefaction processes by use of temperature staging, improved solvents, methane as a feedstock for liquid fuel production, hydrogen sulfide-carbon monoxide-water systems, and exploration of new liquefaction chemistry and coprocessing concepts. ($533)

III. Coal Liquefaction (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Advanced Research (Cont'd)	Continued research to obtain a better understanding of coal liquefaction, reactions of synthesis gas, effects of mineral matter in coal and properties of coal liquids. ($2,118)	Continued research to improve the understanding of coal liquefaction including properties of coal, reaction mechanisms, utilization of hydrogen, and properties of coal liquids. In-house research performed at PETC. Continued research at UNDERC ($355) on the role of oxygen chemistry in coal liquefaction. ($1,800) Of this amount, $315 for UNDERC is proposed for rescission.	Continue research to improve the understanding of coal liquefaction including: investigation of hydrogen utilization during coal liquefaction, continue support of Coal Sample Bank/Data Bank, use of high temperature spectroscopy to elucidate the mechanism of coal liquefaction and examine the ways in which molecules of different coals react with other molecules during the liquefaction reaction. ($1,057)
	Continued research on biological approaches to coal liquefaction. ($192)	Continued research on biological approaches to coal liquefaction. Included work performed by ORNL and in-house research performed at PETC. ($425)	Continue research on biological approaches to coal liquefaction including the mechanisms by which enzymes from bacteria or fungi attack coals and coal products to initiate liquefaction, elucidation of chemistry of bond-breaking under bioliquefaction conditions and bioliquefaction of coal in fluidized media. ($343)
	Continued research on application of new and evolving concepts in catalysis to coal liquefaction. ($577)	Continued research on novel catalytic approaches to coal liquefaction. Initiated research on computer assisted designs for tailored coal liquefaction catalysts. Included work performed by national labs. ($780)	Continue research on novel catalytic approaches including catalysts with improved activity for coal liquefaction and novel catalytic approaches to low-temperature hydrogenation, and use of computer assisted design for tailored catalysts. ($537)
	Continued research on the physical, chemical and thermodynamic properties of fossil fuel liquids. ($1,069)	Continued research on the physical, chemical and thermodynamic properties of fossil fuel liquids. Included work performed at NIPER ($618) and in-house research at PETC. ($922)	Continue research on the physical, chemical and thermodynamic properties of polycyclic compounds representative of those found in coal-derived liquids. Measure properties and develop correlations for liquids obtained from coal liquefaction process streams. ($520)
Indirect Liquefaction	Completed operation and data acquisition from MTG pilot plant in collaboration with W. Germany. (prior year funds)	No activity. ($0)	No activity. ($0)
	Completed initial operation of the liquid phase methanol PDU in LaPorte, TX, and related methanol research. ($4,874)	Completed additional operation and related research on liquid phase methanol (LaPorte, TX) utilizing funds totalling $7,150, of which $4,850 is from prior year funding. ($2,300) The total funding of $2,300 is proposed for rescission.	No activity. ($0)

III. Coal Liquefaction (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Indirect Liquefaction (Cont'd)	Continued to emphasize laboratory catalyst research, provide data base, and support limited industrial research on advanced process concepts. ($4,451)	Continued catalyst research, study reaction mechanisms and more promising process concepts at PETC and with industry and universities. ($3,964)	Continue laboratory research at PETC investigating new catalyst/reactor systems to efficiently convert coal derived gaseous feedstocks to gasoline, diesel, or jet fuels. Continue cost-shared process oriented projects with industry and universities. ($2,530)
Direct Liquefaction	Continued laboratory scale investigation of advanced process concepts and limited industrial bench scale research. ($6,594)	Continued in-house research of advanced process concepts at PETC while continuing existing bench scale industrial projects. Continue low rank coal liquefaction research at UNDERC. ($4,910) Of this amount, $704 for UNDERC is proposed for rescission.	Continue PETC in-house research. Continue bench scale industrial research in coprocessing and/or staged catalytic liquifaction. Continue research on novel approaches to coal liquefaction. ($2,990)
	Completed operation of the coal liquefaction research facility at Wilsonville, Alabama. ($6,213)	Completed additional operation of the coal liquefaction research facility at Wilsonville, Alabama. ($7,000) Of this amount, $4,150 is proposed for rescission.	No activity. ($0)
Support Studies/ Engineering Evaluations	Completed biomedical studies with emphasis on products from coprocessing coal and residual petroleum. ($950)	No activity. ($0)	No activity. ($0)
	Completed research guidance studies and instrument and component research. ($1,525)	Completed one existing industrial instrument research project. ($40)	No activity. ($0)
	Completed liquefaction data base management activities with focus on analysis and consolidation of data. ($665)	No activity. ($0)	No activity. ($0)
	Continued laboratory research in support of advanced process research activities with emphasis on solvent quality characterization, reaction kinetics and catalyst deactivation. ($1,191)	Continued technology base research with emphasis on solvent quality characterization, reaction kinetics and catalysts characterization. Continued data base acquisition and evaluation activities. ($1,352)	Continue to develop solvent quality characterization and process evaluation information on advanced coal liquefaction processes including two stage catalytic liquefaction, co-processing and novel thermal liquefaction process concepts ($320). Continue mechanistic and characterization studies; novel catalyst development; and process studies at Sandia National Lab ($670). (Total $990)
Total, Coal Liquefaction	$31,620	$24,107	$9,500

IV. Construction Projects

o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Combustion Systems

FY 1987 Appropriation enacted	$15,142
Atmospheric Fluidized Bed Combustion	
o Completed vortex combustion activities	-500
o Discontinued funding for UNDERC	-218
o Completed design follow-on studies for AFB technologies to reduce product cost	-91
o Reduced number of advanced concept units selected for follow-on effort	-700
o Reduced number of special application projects selected for bench scale testing	-200
Subtotal	-1,709
Pressurized Fluidized Bed Combustion	
o Completed testing of advanced hot gas cleanup devices and continued combustion characterization testing	-100
o Initiated verification of promising candidate alloys	+220
o Increased effort at METC Fluid Bed Research Facility; initiated advanced sorbents evaluation; determined PFB issues and constraints for industrial markets	+878
o Completed follow-on testing at Grimethorpe	-1,325
o Maintained Advanced Concepts Phase II schedule	+1,516
Subtotal	+1,189

Combustion Systems (Cont'd)

Advanced Combustion Technology

- o Discontinued the development of advanced combustor technologies and devices (not limited to slagging combustors) for utility and industrial applications .... -284

Alternative Fuels Utilization

- o Discontinued UNDERC low rank CWM research and increased coal-based fuel testing and characterization in support of advanced combustor program .... +262

Limestone Injected Multistage Burners (LIMB)

- o Continued commercial-scale demonstrated on a tangentially-fired utility boiler .... +7,000

FY 1988 Congressional Budget Request $21,600

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

COAL

I. Preface: Combustion Systems

One solution to reducing our dependence on oil as an energy resource is to convert oil- and gas-fired utility, industrial, and residential/commercial facilities to coal-based fuel as quickly as possible and to develop technologies for their continued use. Additionally, new combustion technology and coal-based fuels provide opportunity to reduce environmental emissions and extend plant life of existing coal-fired plants. The Department of Energy has developed a program to increase the contribution and application of the nation's coal resources through the development of acceptable combustion systems and fossil-derived fuels for the marketplace. The programs within the overall Combustion Systems activity are Atmospheric Fluidized Bed, Pressurized Fluidized Bed, Alternative Fuels and Advanced Combustion Technology. First generation AFB technology is considered commercial. Nineteen U.S. boiler manufacturers are offering commercial units and approximately 105 units are either in operation or under manufacture. The Fossil Energy program is directed towards second generation AFG technology (i.e., the small industrial boiler, commercial, and residential markets). Pressurized fluidized bed combustion (PFBC) technology involves burning coal in a bed of limestone (calcium carbonate) or dolomite (calcium magnesium carbonate) inside a furnace operated at elevated pressures. The advantages of this over other competing technologies is that it has the potential for higher efficiency, lower capital and operating costs, superior environmental performance, the ability to burn a wide variety of fuels, modularity, and retrofit capabilities. The Advanced Combustion program is developng a broad range of new combustion technologies to encourage the use of coal and coal-based fuels that have the potential to displace oil and gas. These advanced comustion systems are applicable to retrofit, light industrial, commercial, and residential markets where coal use has traditionally been limited. The Alternative Fuels program complements the other Combustion Systems technology development efforts in that it will establish the generic technology base for coal slurry fuels. The standard for these fuels is that they have the potential for replacing oil and gas in both existing and new light industrial, residential, and commercial applications. The Limestone Injection Multistage Burners (LIMB) control technology program is designed to develop and demonstrate an effective and inexpensive emission control that will simultaneously remove SOx and NOx from boiler flue gases of new and existing pulverized coal boilers. Under the Combustion Systems activity, it is specifically directed towards the commercial-scale demonstration of LIMB on a tangentially-fired utility boiler. Funds for the demonstration will be transferred to EPA to conduct the research for this program.

II. A. Summary Table

II. A. Summary Table	FY 1986	FY 1987	FY 1988	% Change
Atmospheric Fludized Bed Combustion	$16,572	$3,309	$1,600	-52
Pressurized Fluidized Bed Combustion	5,061	5,837	7,026	+20
Advanced Combustion Technology	3,409	2,758	2,474	-10
Alternative Fuels Utilization	4,071	3,238	3,500	+8
Limestone Injection Multistage Burners			7,000	N/A
Total, Combustion Systems	$29,113	$15,142 1/	$21,600	+43

1/ Of this amount, $777,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
Foster Wheeler Development Corporation	$3,716	$2,094	$3,750
Energy International, Inc.	$796	$1,124	$1,762
Pittsburgh Energy Technology Center	$850	$2,006	$2,150
National Coal Board	$3,213	$1,569	$300

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Atmospheric Fluidized Bed Combustion	Supported the TVA 160 MWe demonstration project. ($15,000)	No activity. ($0)	No activity. ($0)
	Completed operations of East Stroudsburg and Wilkes-Barre AFB units utilizing prior year funding of $4,800. ($0)	No activity. ($0)	No activity. ($0)
	Continued erosion, low rank coal, and economic studies of critical cost elements and in-house research. ($675)	Completed design follow-on from economic studies; conducted in-house fluidization research in particle motion flow, erosion, bed internals and heat transfer surfaces. Continued cooperative efforts with UNDERC and innovative vortex combustion development. ($1,209) Of this amount, $193 for UNDERC is proposed for rescission.	Continue to conduct experimental and analytical erosion studies. ($400)
	Completed economic system studies and commenced bench scale testing of advanced concepts. ($550)	Continued bench scale testing of the advanced concepts program. ($1,000)	Continue advanced concept follow-on effort for varying test levels through proof-of-concept with an increasing degree of cost share by the private sector. ($300)
	Initiated systems studies and bench designs of special AFB applications for commercial/institutional and residential sectors. ($347)	Completed system studies and bench scale designs. Initiated bench scale construction and testing. ($1,100)	Complete bench scale construction and begin operational testing of selected units within the Special Applications Program. ($900)
Pressurized Fluidized Bed Combustion	Continued program at NYU to test and evaluate advanced hot gas cleanup devices. ($769)	Continued ongoing program at NYU to evaluate PFB components and design changes to enhance performance and provide the basis for advanced concept designs. ($600)	Complete testing of advanced hot gas cleanup devices and continue evaluation of PFB components, design alterations and changes in operating parameters to improve systems reliability, reduce costs and enhance environmental performance. ($500)
	Completed laboratory metal wastage investigations to verify the mechanisms and kinetics of coal/sorbent combustion products, particle energies and materials survivability. ($480)	Initiated experimental studies of heat transfer tubes metal wastage. ($280)	Continue modeling studies to predict tube erosion/corrosion and linking criteria. Also, based on prior testing at NYU determine mechanisms for tube wastage to identify promising candidate alloys for long term laboratory testing that satisfy industrial standards. ($500)

III. Combustion Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Pressurized Fluidized Bed Combustion (Cont'd)	Continued research on data analysis, mechanism studies, and engineering/systems analysis. ($676)	Continued research on PFB dynamics, systems analysis, and combustion characterization; continued technology and economic analysis assessments. Continued erosion/corrosion studies under the cooperative effort with UNDERC. ($898) Of this amount, $276 for UNDERC is proposed for rescission.	Continue R&D at METC on PFB dynamics, systems analysis and combustion characterization. Continue technology and economic analysis assessments. Identify data gaps and evaluate the use of "non-conventional" sorbents in advanced PFB systems. Determine technical and institutional issues and constraints which could prevent PFB from penetrating the industrial sector. ($1,776)
	Initiated cost-shared follow-on effort to test key critical PFB process components and to obtain process performance data. An additional $1,772 of prior year funding will be used for this effort. ($1,441)	Continued follow-on test program to obtain POC on hot gas cleanup, coal/water slurry feeding, and performance of updated heat exchanger design. Conducted 500 hours of operational testing for this project. ($1,825)	Complete cost-shared follow-on efforts and prepare final reports. ($500)
	Awarded contract and initiated a multi-phase cost-shared program with the industrial sector for a high efficiency PFB system which will provide improvements in process economics as well as reliability, operability and environmental performance. Total funds of $4,009 included prior year funding of $2,314. ($1,695)	Completed Phase I systems definition studies including conceptual design and cost of a commercial plant. Initiated Phase II, development and testing of key critical process components. ($2,234)	Continue Advanced Concepts Phase II development and maintain project schedule and scope of work by testing key critical process components such as the pressurized circulating bed combustor required to confirm proof-of-concept. The Advanced PFB concepts program offers to substantially improve the process performance by increasing system efficiency to 45 percent and improving economics by reducing the cost of electricity by 20 percent. ($3,750)
Advanced Combustion Technology	Completed efforts associated with the AVCO advanced slagging combustor project, including tests on the bench scale combustor ($765); the TRW advanced slagging combustor project (prior year funding); and the AVCO pulsed combustor project ($433). (Total $1,198)	No activity. ($0)	No activity. ($0)

III. Combustion Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Advanced Combustion Technology (Cont'd)	Awarded contracts and initiated Phase I efforts consisting of economic and environmental assessments for light industrial, commercial, and residential concepts. ($1,655)	Continued development of the most promising of the concepts selected including design, fabrication and testing. Continued development of advanced combustion systems for industrial and utility applications. This activity included support for project management activity. ($2,108)	Continue base program for the development of the most promising advanced combustion systems for retrofit, light industrial, commercial/institutional and residential applications. Industrial and utility applications of advanced combustors, which were initiated in FY 1987, will be discontinued. This activity also includes project management support. ($1,824)
	Initiated the investigation of SOx and NOx emissions from combustors using varying air fuel ratios; conducted fuel characterization studies; conducted dense phase transport investigations; collected, organized and archived data. ($556)	Continued in-house activities supporting advanced combustion technology systems. Supported advanced combustion systems for industrial and utility applications. Combustion tests using chemical radical injection and electric fields was also conducted. ($650)	Continue in-house activities including combustion and system characterization of coal based fuels. This activity also includes data base development for technology transfer to the private sector. ($650)
Alternative Fuels Utilization	Completed selection and award of competitive solicitation to identify, formulate, analyze and deliver such premium coal-based fuels to experimental groups involved in developing "advanced combustion systems" for light industrial, commercial/institutional and residential markets. Initiated emissions characterizations studies to address potential and actual effluents/intrusion from CLM/ micro-coal in these applications. Continued development and testing of LRC fuel types. Continued the exchange of data and technical advancements with the international sector. ($4,071)	Initiated testing of selected premium coal based fuels on existing in-house units and "advanced combustion" boiler/furnaces for the light industrial, commercial/institutional and residential sectors. Continued characterization, formulation and testing using highly beneficiated coals. Using UNDERC funding, investigated low rank CWM as an alternative fuel in support of the advanced combustion system program. Continued detailed combustion and emission characterization of effluents/intrusions on the existing in-house boiler/furnace units. Continued in-house development and testing of advanced LRC fuel types as well as technology exchange with the international sector. ($3,238) Of this amount, $308 for UNDERC is proposed for rescission.	Continue identification, formulation and characterization of coal-based fuels in support of the advanced combustion systems program. This activity includes transport, handling and storage studies. Continue project management support and international cooperative research. ($2,000) Continue in-house activities in fuel rheology, emissions characterization, dense phase combustion tests of ultra fine beneficiated coal and data base development for technology transfer to the private sector. ($1,500) (Total $3,500)
Limestone Injection Multistage Burners	EPA activity.	Initiated commercial-scale demonstration of LIMB on a tangentially-fired utility boiler. (Funded under EPA appropriation). ($0)	Provide funding to EPA to continue commercial-scale demonstration on tangentially-fired utility boiler. Complete design phase. ($7,000)
Total, Combustion Systems	$29,113	$15,142	$21,600

IV. Construction Projects

o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Fuel Cells

FY 1987 Appropriation enacted	$28,084
Phosphoric Acid Systems	
o Complete all participation in the development of the 11MW and 7.5MW electric utility systems, on-site water-cooled and dielectric cooled systems and leave responsibility to the private sector for and further development and application of these technologies	-15,500
Molten Carbonate Systems	
o Continue development efforts on either the internal or external reforming molten carbonate stack to focus on the most advantageous stack technology. Eliminate funding of a contaminant resistant cell concept. Reduce the technology base research and program evaluation effort	-4,421
Advanced Concepts	
o Continue developing a solid oxide generator module of 25 to 200 kW size at a reduced level of effort. Reduce new concepts development effort and program evaluation	-2,963
FY 1988 Congressional Budget Request	$ 5,200

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

COAL

I. Preface: Fuel Cells

The objective of the Fuel Cells program is to support high risk, high payoff technology base development and to assist private industry in developing hydrocarbon fuel conversion technologies to increase the cost effective, efficient and environmentally acceptable use of conventional and alternative hydrocarbon fuels. Phosphoric acid systems have reached a near-commercial technical status with large scale testing underway. The technical feasibility of molten carbonate fuel cells operating at approximately 60 percent electrical conversion efficiency (natural gas to busbar) has been forecasted by single cell testing. The complexity and associated capital costs of advanced fuel cell systems are projected to be less than those for first generation phosphoric acid fuel cell systems. Solid oxide electrolyte fuel cells have the advantage of solid state stability and have been projected to be more easily manufactured. The solid oxide fuel cell is an advanced, high temperature solid state fuel cell that offers promise in electric utility and in cogeneration applications in industrial and commercial sectors. Systems are being designed and components are being developed for eventual operation using coal and coal derived fuels.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Phosphoric Acid Systems	$20,355	$15,500	$0	-100
Molten Carbonate Systems	9,932	7,621	3,200	-58
Advanced Concepts	3,770	4,963	2,000	-60
Total, Fuel Cells	$34,057	$28,084 1/	$5,200	-81

1/ Of this amount, $12,300,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding

Engelhard Corp.	$1,658	$1,210	$0
International Fuel Cells	$4,179	$3,882	$0
Westinghouse Electric Corp. (Phosphoric Acid)	$11,190	$4,000	$1,600
Westinghouse Electric Corp. (Molten Carbonate)	$3,517	$9,705	$0
United Technologies, Inc. (IFC)	$1,030	$1,515	$0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Phosphoric Acid Systems	Continued technology development of water-cooled on-site systems; performed verification tests of prototype stack and plant subsystems. ($5,591)	Completed endurance testing of a full area on-site short stack of configuration "B" cells. Completed development and initiated test of 200 kW water-cooled, on-site system (verification test article). Verified, through extended tests, that earlier performance problems have been solved. ($2,000) The total funding of $2,000 is proposed for rescission.	Complete testing of 200 kW water-cooled on-site system (verification test article) to verify endurance and correct problems observed in testing. These activities will be conducted with $1,000 in uncosted prior year funding. ($0)

Program Activity	FY 1986	FY 1987	FY 1988
Phosphoric Acid Systems (Cont'd)	Began testing of 25 kW on-site system including fuel cell stack, fuel processor and inverter. ($2,190)	Completed tests of second 25 kW dielectric-cooled on-site stack and began tests of integrated 25 kW system. ($1,500) The total funding of $1,500 is proposed for rescission.	Complete tests of integrated 25 kW system. These tests will be conducted with $750 in uncosted prior year funding. ($0)
	Continued inverter and stack technology work on the 11 MW water-cooled electric utility technology through development of stack configuration "B". ($1,903)	Continued electric utility water-cooled stack and component advancement. Evaluated operation of the full size (700 kW) stack of the 11 MW technology during 1000 hour test. Performed extended stack testing beyond 1000 hours as appropriate. Initiated effort to develop advanced configuration "B" cell for 11 MW system. Total funding of $3,515 which includes $1,515 in prior year funds for additional hours of stack testing. ($2,000) The total funding of $2,000 is proposed for rescission.	Continue development of advanced configuration "B" cell including completion of performance test of second short stack of this design. These activities will be conducted with $1,800 in uncosted prior year funding. ($0)
	Continued electric utility R&D with air-cooled stacks for a 7.5 MW system (began tests of 25 kW stacks and design of a 100 kW engineering model stack). ($10,471)	Continued electric utility R&D on air-cooled stacks with tests of 25/32 kW stacks and design of a 100 kW engineering model stack. Initiated tests of 100 kW stack. ($10,000) Of this amount, $6,800 is proposed for rescission.	No activity. ($0)
	Continued a small activity for analytical evaluations in support of the above development efforts. ($200)	Conducted a Congressionally-directed study on the feasibility of a program to investigate advancement of basic technology and conducted program evaluations and support utilizing funding from the above activities. ($0)	No activity. ($0)
Molten Carbonate Systems	Initiated verification testing of first external reforming, large area short stack. Completed development of direct fueled concept in small cells. Initiated PRDA to continue development of external and/or internal reforming molten carbonate stacks. ($7,831)	Continued development of external and internal reforming molten carbonate technology under current efforts until stack development work resulting from competitive PRDA can begin. Initiated external and/or internal reforming stack development under contracts resulting from competitive PRDA. Conducted program evaluations and support. Total of $11,130 which includes $5,030 in prior year funds to continue current efforts until awards are made under the PRDA. ($6,100)	Continue development and scale-up of the single most promising molten carbonate stack activity. Continue program evaluations and support. ($3,100)
	Initiated development of a contaminant resistant molten carbonate cell. ($476)	Continued development of a contaminant resistant cell and achieved early test evaluations; conducted program evaluations and support. ($1,000)	Continue development of a contaminant resistant cell to overcome problem areas identified in early tests utilizing $500 in uncosted prior year funds. ($0)

III. Fuel Cells (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Molten Carbonate Systems (cont'd)	Continued system studies and research on contaminants, cell corrosion, cell mechanical deformation and electrolyte composition. ($1,147)	Continued technology base research on promising concepts, electrodes and materials development; conducted program evaluations and support. ($521)	Continue technology base research on promising concepts, electrodes and materials development. ($100)
	Completed a study at ANL on promising new materials for use as cell cathodes and supporting research. ($478)	No activity. ($0)	No activity. ($0)
Advanced Concepts	Continued development of a tubular solid oxide fuel cell concept with fabrication and initial testing of a 5 kW module and initial design of a 25 to 200 kW generator. ($3,251)	Performed post test analysis of 5 kW solid oxide module and implemented corrective action needed to achieve extended operating life. Continued development of a 25 to 200 kW generator. Conducted program evaluations and support. ($4,163)	Continue development of a solid oxide 25 to 200 kW generator module at a reduced level of effort. Continue program evaluations and support. ($1,647)
	Continued system studies and research on solid oxide fuel cell materials, cell fabrication techniques and new concept evaluations. ($519)	Continued system studies and research on advanced concepts including solid polymer electrolyte technology and evaluation of new concepts. Conducted program evaluations and support. ($800)	Continue system studies and research on advanced concepts, evaluation of new concepts and program evaluation and support. ($353)
Total, Fuel Cells	$34,057	$28,084	$5,200

IV. Construction Projects

- None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Heat Engines

FY 1987 Appropriation enacted	$12,146
Gas Turbines	
o Continue coal-fueled gas turbine integrated systems test with two contractors instead of present four contractors	-2,682
Diesel Engines	
o Continue coal-fueled diesel engine integrated systems test with one contractor instead of two contractors	-1,164
FY 1988 Congressional Budget Request	$ 8,300

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

COAL

I. Preface: Heat Engines

The principal goal of this program is to establish technical data which will enable the private sector to assess the commercial viability of coal-fueled power conversion systems. The program focuses on key technical problems associated with substituting coal or coal-derived gaseous fuels for distillate fuels or natural gas in gas turbine and diesel power conversion systems. Applications for this technology include industrial cogeneration, combined cycle electric power generation, repowering of existing generating capacity, and both rail and marine transportation. The program goal is to assist the private sector, through selected research efforts, to develop the technology needed for direct firing of coal, either dry or suspended in a liquid carrier, or a coal-derived gaseous fuel cleaned at minimal cost.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Gas Turbines	$9,729	$8,982	$6,300	-30
Diesel Engines	2,585	3,164	2,000	-37
Total, Heat Engines	$12,314	$12,146 1/	$8,300	-32

1/ Of this amount, $66,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988
General Electric Co.	$2,422	$3,222	$0
Solar Turbines International	$2,906	$2,000	$0
General Motors/Allison Gas Turbines Division	$5,996	$2,000	$0
Arthur D. Little, Inc.	$566	$1,087	$0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Gas Turbines	Initiated limited research activities of FY 85 PRDA aimed towards that portion of the integrated systems test validation which can be completed in FY 87. Total of $13,855 which includes $5,423 prior year funds. ($8,432)	Completed first portion of the integrated systems test program. ($8,382) Of this amount, $66 for UNDERC is proposed for rescission.	Continue coal-fueled gas turbine integrated systems tests aimed towards proof-of-concept in 1992 with two contractors rather than the original four, reducing the number of technical approaches planned. ($5,800)
	Continued essential engineering test stand evaluation of gas turbine combustor design dry coal fuels in support of major component development contracts. ($1,297)	Continued in-house evaluation of coal-liquid mixtures (CLM) in gas turbine combustor test stand. ($600)	Continue in-house evaluation of CLM in METC pressurized combustor test stand. ($500)

III. Heat Engines (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Gas Turbines (Cont'd)	Completed report requested by Congress on feasibility of coal-fired locomotive. ($0)	No activity. ($0)	No activity. ($0)
Diesels	Continued technical and economic analyses and related experimental feasibility tests of coal-fired diesel power systems for selected locomotive, marine and industrial applications. Initiated PRDA for coal-fired diesel engine integrated systems test validations. ($2,585)	Continued in-house evaluation of CLM in diesel engine test facility. Initiated research activities related to FY 86 PRDA for the coal-fired diesel engine integrated systems test validation. Completed technical and economic analyses and related experimental tests of coal-fired diesel engine project. ($3,164)	Continue in-house evaluation of CLM in METC diesel engine test facility. Continue coal-fueled diesel engine integrated system tests aimed towards proof-of-concept by 1994 with one contractor rather than the scheduled two reducing the number of technical approaches ($2,000)
Total, Heat Engines	$12,314	$12,146	$8,300

IV. Construction Projects

- o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Underground Coal Gasification

FY 1987 Appropriation enacted	$ 2,370
Environmental and Advanced Research	
o Eliminated research to address aquifer contaminant intrusion and transport mechanisms. Eliminated environmental studies and monitoring of previous test sites	-1,159
Gasification Technology Development	
o Completed activities related to the CRIP test	-1,211
FY 1988 Congressional Budget Request	$ 0

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

COAL

I. Preface: Underground Coal Gasification

Underground Coal Gasification (UCG) represents viable technologies for in situ (underground) conversion of coal to a cleaner burning, easily transportable gaseous fuel. UCG technology could substantially expand U.S. coal reserves by making it possible to utilize coal that is presently economically or technically infeasible to mine. Some technical problems that need to be solved include coalbeds that are too thick or deep, contain non-coal occlusions, or have high ash content. Coalbeds that have an excessive angle of dip, and/or which has unpredictable or poor overburden characteristics that make mining unsafe are also candidates for study. In general, program efforts are directed toward the definition of sufficient technical, operational, and environmental parameters to allow industry to make necessary decision as to commercialization, but promise a more economical route to synthesis feedstock suitable for conversion to power, syngas, methanol, gasoline, or diesel fuel.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Gasification Technology Development	$2,352	$1,211	$0	-100
Environmental and Advanced Research	1,720	1,159	0	-100
Total, Underground Coal Gasification	$4,072	$2,370 1/	$0	-100

1/ Of this amount, $1,548,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
Western Research Institute	$1,778	$1,380	$0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Gasification Tech. Development	Completed the first year of a three year cost shared field test to establish a technology base for application of UCG technologies (CRIP) to subbituminous coals. ($1,922) (Partially funded with FY 1985 funds.)	Continued research and compliance related activities in support of cost shared field test at Hanna, Wyoming, and previous test sites. Continued work at WRI on integrating data into the UCG technology base. ($1,211) Of this amount, $1,000 is proposed for rescission.	Completed three year cost shared field test with prior year funds. ($0)
	Completed modeling and supporting research activities in support of field test and investigated the application of data developed in the program to other coal types. ($334)	No activity. ($0)	No activity. ($0)

III. Underground Coal Gasification (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Gasification Tech. Development (Cont'd)	Completed international technology transfer activities in UCG. ($96)	No activity. ($0)	No activity. ($0)
Environmental and Adv. Research	Completed post-burn environmental monitoring and mitigation activities to ensure compliance with state environmental departments and reduce the risk of subsequent development by researchers and industry. ($951)	No activity. ($0)	No activity. ($0)
	Completed laboratory studies of critical process parameters as well as research in the areas of physical, chemical, and microbiological cleanup of phenols and other contaminants which may result from UCG. ($769)	Continued environmental impact planning mitigation research and evaluation through the WRI Cooperative Agreement with emphasis on field based evaluations of aquifer contaminant intrusion and transport mechanisms and methods of affecting clean-up. ($1,159) Of this amount, $548 is proposed for rescission.	No activity. ($0)
Total, Underground Coal Gasification	$4,072	$2,370	$0

IV. Construction Projects

o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Magnetohydrodynamics

FY 1987 Appropriation enacted	$26,500
Magnetohydrodynamics (MHD)	
o Withdraw Federal funding support for the multiyear MHD development program	-26,500
FY 1988 Congressional Budget Request	$ 0

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

COAL

I. Preface: Magnetohydrodynamics (MHD)

The current FY 1987 MHD program continues the implementation of the June 1984 cost-shared multiyear program which provides for basic supporting research and the development of components and subsystems which will furnish the technology base for integrated, long duration, proof-of-concept testing. Long duration proof-of-concept testing is needed for the advancement of the MHD technology to the retrofit testing stage. A retrofit testing stage is needed for the determination of subsequent commercial development. No funds have been requested for the following fiscal years. The Department believes that the cost of continuing its MHD program is not affordable in light of current fiscal constraints.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Proof-of-concept Topping Cycle	$16,498	$16,225	$0	-100
Proof-of-concept Bottoming Cycle	7,148	7,304	0	-100
Proof-of-concept Seed Regeneration	388	104	0	-100
Systems Studies, Support Research and Conceptual Designs	3,683	2,867	0	-100
Total, Magnetohydrodynamics	$27,717	$26,500 1/	$0	-100

1/ Of this amount, $11,569,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
AVCO Everett Research Laboratory, Inc.	$3,847	$3,225	$0
Mississippi State University	$1,939	$2,000	$0
Mountain States Energy, Inc. - CDIF	$9,774	$9,573	$0
University of Tennessee - CFFF	$6,722	$6,702	$0
TRW, Inc.	$1,650	$2,650	$0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Proof-of-Concept Topping Cycle	Planned competitive solicitation for design and construction of an integrated topping cycle. ($90)	Initiated design and construction and independent design reviews of an integrated topping cycle in 4th quarter totaling $550 which includes $400 prior year funds. ($150)	No activity. ($0)
	Developed MHD channels and current control circuits. Work performed by AVCO Research Lab. ($4,491)	Completed 64 current control circuits. Fabricated new sidewalls for existing channels. Conducted parametric studies ($3,356) Of this amount, $1,570 is proposed for rescission.	No activity. ($0)

III. Magnetohydrodynamics (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Proof-of-Concept Topping Cycle (cont'd)	Developed 50 MW thermal coal-fired combustors for testing at the CDIF. Work performed by TRW. ($2,706)	Completed characterization tests of combustor at the CDIF. Fabricated continuous slag rejection system. Analyzed test results. ($2,758) Of this amount, $1,230 is proposed for rescission.	No activity. ($0)
	Continued short-duration testing at CDIF. Work performed by Mountain States Energy. ($9,211)	Completed 8 hour continuous run with integrated system in support of POC design. Optimized operating parameters for POC tests. ($9,961) Of this amount, $5,270 is proposed for rescission.	No activity. ($0)
Bottoming Cycle	Planned competitive solicitation for design and construction of an integrated bottoming cycle. ($85)	Initiated design and construction of an integrated bottoming cycle in 4th quarter. Conducted independent design reviews. Total of $248 which includes $175 prior year funds. ($73)	No activity. ($0)
	Continued operation of Fossil Energy User Laboratory. Work performed by Argonne National Lab. ($777)	Established operating conditions for scale control in POC tests. Continued corrosion tests. Correlated test results. Total of $806 which includes $650 prior year funds. ($156)	No activity. ($0)
	Continued development of technology base for HRSR subsystem. Work performed by Babcock and Wilcox. ($87)	Developed HRSR test requirements for POC program. Assisted in test program development. ($104)	No activity. ($0)
	Continued short-duration testing at CFFF. Work performed by Univ. of Tenn. ($6,199)	Completed 100 hours of testing in support of POC design. Conducted independent design reviews. ($6,971) Of this amount, $3,499 is proposed for rescission.	No activity. ($0)
Proof-of-Concept Seed Regeneration	Planned competitive solicitation of contractor for seed regeneration process development. ($388)	Initiated development of seed regeneration processes in 4th quarter. Evaluated process designs. Total of $354 which includes $250 prior year funds. ($104)	No activity. ($0)
Systems Studies, Supporting Res., and Conceptual Retrofit Plant	Completed use of computer models to analyze and predict MHD performance. Work performed by STD. ($628)	No activity. ($0)	No activity. ($0)
	Completed fundamental research on MHD phenomena. Work performed by Stanford Univ. ($175)	Provided engineering assistance in gas dynamics and combustion in support of POC design. Conducted independent design reviews. ($85)	No activity. ($0)

III. Magnetohydrodynamics (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Systems Studies, Supporting Res., and Conceptual Retrofit Plant (cont'd)	Completed development of engineering data base for MHD power trains. Work performed by Westinghouse Electric. ($217)	No activity. ($0)	No activity. ($0)
	Continued development of super conducting magnet technology. Work performed by MIT. ($218)	Initiated fabrication of prototypic section of internally cooled superconductor. Reviewed superconductor magnet technology. ($208)	No activity. ($0)
	Continued development of diagnostic instrumentation. Work performed by Miss. State Univ. ($1,747)	Provided instrumentation support at the CDIF and CFFF during tests. Provided instrumentation technology. ($2,080)	No activity. ($0)
	Continued technical support. ($436)	Provided technical support for POC program totaling $537 which includes $225 prior year funds. ($312)	No activity. ($0)
	Continued administration of MHD contracts for PETC. Work performed by Chicago Operations Office. ($87)	Provided contract administration support for PETC. ($94)	No activity. ($0)
	Planned competitive solicitation of contractors for conceptual designs of retrofit plants. ($175)	Initiated conceptual design of retrofit plants. Conducted independent design reviews. Total of $283 which includes $195 prior year funds. ($88)	No activity. ($0)
Total, Magnetohydrodynamics	$27,717	$26,500	$0

IV. Construction Projects

- o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Surface Coal Gasification

FY 1987 Appropriation enacted	$24,655
Advanced Research	
o Discontinued work at UNDERC on ash and slag chemistry and on the evolution of sulfur and alkali in gasification reactions; cancel work on biological conversion; cancel work on separation of hydrogen using regenerable liquid hydrides and supported metal complexes; discontinue work on plasma chemistry and the kinetics of devolatilization	-2,166
Systems for Power Production	
o Completed operation of pressurized fluidized bed gasifier with in-bed and external hot gas cleanup	-9,000
o Completed operation of pressurized fixed bed gasifier to explore issues limiting the integration and development of gasifier/advanced hot gas cleanup/turbine system for power production	-2,000
o Completed first phase of investigation of high temperature in-bed and external sulfur capture in entrained flow gasifier	-1,300
o Completed development, environmental sampling and analysis of hot gas cleanup systems, utilization of results from absorbent screening tests to establish reaction mechanisms to permit better control of gasifier performance	-582
Subtotal	-12,882
Systems for Industrial Fuel Gas Production	
o Completed work on low cost oxygen production plants, including zirconia solid membrane component, low cost protective coatings and claddings, development of ceramic fiber - ceramic matrix hot gas filter, iron aluminide for use in severe high temperature corrosive environments	-235

Surface Coal Gasification (Cont'd)

Systems for Synthesis Gas Production

o Completed investigation of promising methods for dense flow injection/feed to entrained flow gasifiers, attrition/entrainment studies related to fluidized bed gasifiers. Continued DOE/GRI cooperative program in coal gasification, system engineering analysis	+364
o Completed UNDERC cooperative program concerned with advanced waste water treatment investigations, synthesis gas upgrading studies, low cost hydrogen experiments, stretford waste characterization	-946
Subtotal	-582

Systems for Coproducts Production

o Investigated at reduced level rapid devolatilization, upgrading of coal derived liquids, meld gasification systems analysis, novel electrochemical process for coal liquids, mild solid fluid bed phenomena and development of recirculating catalysts	-1,915
o Completed investigations into production testing of mild gasification processes at UNDERC	-388
o Completed comprehensive study directed toward development of high BTU content fuels for defense purposes	-500
o Completed investigation of parameters of utilizing gasifier products as fuels for heat engines. Completed development of analytical models used to identify gasifier systems	-250
Subtotal	-3,053

Great Plains Coal Gasification Project

o Completed post operation assessments and provided for administrative close-out expenses	+63
FY 1988 Congressional Budget Request	$ 5,800

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

COAL

I. Preface: Surface Coal Gasification

The efficient and environmentally sound use of our single, most abundant fossil fuel, coal, is essential to our long range energy self sufficiency and national security. Energy systems based on coal gasification technology could provide a cost effective and an environmentally superior means for meeting the needs of the utility, industrial, residential, transportation and commercial sectors. In order to achieve its potential, significant technical advances must be made to improve the performance and reduce the costs of gasification systems. To meet these objectives, an extensive program of high risk, high payoff research and development is being funded by the Department of Energy; in many cases, on a cost-shared basis with private industry.

The coal gasification program is organized to foster the development of advanced gasifier systems for the production of: electric power, synthesis gas (for synthetic natural gas, indirect liquefaction, and chemical feedstocks), industrial fuel gas, and coproducts (simultaneous production of solids, liquids, and gases). This new organization has resulted in a revised budget structure that better reflects the relationship between program content and the interests of the potential end-users.

Projections on demand for power in the 1995-2000 time frame clearly indicate a need for clean and more efficient modular-type power plants. Advanced gasification systems could become the power generation option of choice for both new plants and repowering of existing plants. The development of an economically and environmentally attractive coal gasification system for the production of an industrial fuel gas will provide an important energy alternative to the industrial sector, which currently is the second largest major user of petroleum products after the transportation sector. Another very large market sector can be served by coal gasification systems to produce synthesis gas. Synthesis gas can be used to produce liquids, such as methanol, by indirect liquefaction; to produce hydrogen and carbon monoxide gases, which are required by industry in the production of other chemical products, such as ammonia; and as a gas that can be shifted and methanated to produce synthetic natural gas. The remaining coal gasification development effort is an emerging program which, if successful, would open up a much broader market for the coal liquids produced along with coal gas and clean coal char solids. These new fuels could replace a significant portion of petroleum based feedstock currently being used. This activity also provides for basic and fundamental research related to Surface Coal Gasification processes including studies of reaction mechanisms and chemistry. In addition, this program supports the continued management and modeling of the Great Plains Project.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Advanced Research	$3,379	$2.806	$640	-77
Systems for Power Production	28,150	14,382	1,500	-90
Systems for Industrial Fuel Gas Production	1,502	1,235	1,000	-19
Systems for Synthesis Gas Production	1,389	1,742	1,160	-33
Systems for Coproducts Production	4,250	4,053	1,000	-75
Great Plains Coal Gasification Project	2,653	437	500	+14
Total, Surface Coal Gasification	$41,323	$24,655 1/	$5,800	-76

1/ Of this amount, $1,376,000 is proposed for rescission.

Surface Coal Gasification (Cont'd)

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
General Electric Company	$10	$3,127	$0
Waltz Mill Process Development Unit	$8,641	$9,000	$0
Morgantown Energy Technology Center	$1,085	$3,533	$1,063
University of North Dakota Energy Research Center	$1,471	$1,563	$0
Texaco, Inc.	$0	$1,300	$0
United Coal Corporation	$0	$1,454	$0
KILnGAS Demo Gasifier	$14,269	$6,000	$0
EG&G, Inc.	$1,777	$0	$1,872
University of Oklahoma	$0	$2,433	$0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Advanced Research	Continued to investigate the fundamental chemistry of coal gasification, novel approaches to coal gasification such as new catalyst systems, and catalytic upgrading of synthesis gas to enhance hydrogen recovery ($1,511). Conducted investigation on the chemistry of ash and slag from coal gasifiers ($581). (Total $2,092)	Continued research on the fundamental chemistry and reaction mechanisms associated with mild gasification and investigated the parameters that control product yield distribution. Continued research on the chemistry of ash and slag from coal gasifiers. Developed biological conversion techniques to directly convert coal to methane and to upgrade synthesis gas to methane. Conducted research to determine the evolution of sulfur and alkali in gasification reactions and methods of controlling concentrations in the product gas. Efforts are supported with $218 of UNDERC funding of which $194 is proposed for rescission. ($1,939)	Continue research on the fundamental chemistry and reaction mechanisms of coal gasification and the use of catalysts to control product yield distributions. Discontinue work at UNDERC on ash and slag chemistry. ($410)
	Continued investigation of novel approaches to gas separation, such as supported metal complexes and membranes ($447). Continued investigation of the kinetics of devolatilization and gasification of coal through development and experimental verification of computer models ($840). (Total $1,287)	Continued investigation of novel approaches to gas separations, such as supported metal complexes, ion exchange membranes, and regenerable liquid organic hydrides. Continued investigation of the kinetics of devolitalization through the development of improved predictive models of gasification processes and continued investigation of the factors controlling bond cleavage and formation in coal molecules. ($867)	Continue efforts on separating hydrogen from synthesis gas using ion exchange membranes. Continue research on understanding the factors controlling the cleavage and restoration of bonds in coal molecules leading to the development of practical pretreatment methods to obtain higher product yields. ($230)

III. Surface Coal Gasification (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Systems for Power Production	Continued operation of advanced gasification concepts facility to generate data essential to advancing entrained gasification and hot gas cleanup technology. ($384) Identified and developed process modifications that will reduce the generation of trace hazardous compounds. ($384) Reactivated the fixed-bed gasifier at METC to generate flue gas to evaluate and develop advanced hot gas cleanup systems ($874). Completed high pressure bench scale study to determine suitability of composite sorbents for cleanup of gas streams ($200). (Total $1,842)	Continued operation of advanced gasification concepts facility to generate data essential to advancing entrained gasification and hot gas cleanup technology ($692). Continued development of process modifications that will reduce the generation of trace hazardous compounds. Initiated comprehensive environmental sampling and analysis of systems employing hot gas cleanup systems ($549). Completed key studies on integration of METC fixed bed gasifiers/gasification technologies with other conversion systems. Utilized results of studies on composite sorbents, mixed metal oxides, catalysts, etc. to establish reaction mechanisms by which gasifier performance can be controlled through use of in-bed/coal-feed additives ($841). (Total $2,082)	Continue studies on entrained flow reactors and associated materials and component development efforts to determine effects of extreme gasification conditions ($485). Continue development of techniques for environmental characterization of power systems, sampling of operating systems and evaluate hot gas cleanup candidate technologies ($200). Continue operation of fixed-bed gasifier at METC to generate flue gas to evaluate and develop advanced hot gas cleanup systems ($815). (Total $1,500)
	Completed key studies on the integrated operation of gasifier hot gas (particulate removal and sulfur removal) systems and gas turbines to identify and solve R&D integration problems. ($1,428)	Began PDU effort exploring issues limiting the integration and development of gasifier/advanced hot gas cleanup systems/turbines for the production of power. Expand work on the integration and operation of the Schenectady fixed bed gasifier, hot gas clean-up unit, and turbine simulator. Total funding for this project is $3,040 of which $1,040 is prior year funding. ($2,000)	No activity. ($0)
	Continued studies of the KILnGAS coal gasification system to determine key operational parameters. ($14,336)	Completed studies of the KILnGAS coal gasification system using prior year funding. ($0)	No activity. ($0)
	Completed PDU work at Waltz Mill PDU on the study, development and evaluation of integrated gasification/hot gas cleanup/fuel use systems for utility applications. Total funding for this project is $8,641 of which $39 is prior year funding. ($8,602)	Completed integrated operation of pressurized fluid bed gasifier with hot gas clean-up concepts including sulfur, NOx, and particulate control. ($9,000)	No activity. ($0)
	No activity. ($0)	Initiated high temperature in-situ sulfur capture tests. ($1,300)	No activity. ($0)
	Completed investigation of high pressure, high temperature, fluidized-bed gasification interrelationships. ($264)	No activity. ($0)	No activity. ($0)

III. Surface Coal Gasification (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Systems for Power Production (cont'd)	Completed investigation of promising techniques with the potential to decrease the amount of water used in gasification through process modification and recycle. ($236)		No activity. ($0)
	Completed development, correlation and evaluation of gasification data for use in and improvements of the ASPEN process model. ($384)	No activity. ($0)	No activity. ($0)
	Completed studies on innovative techniques for essential in-line measuring instruments to determine process parameters/gas compositions essential to process control and evaluation. ($438)	No activity. ($0)	No activity. ($0)
	Completed studies on advanced concepts for coal gasification cleanup processes and investigated applications of new coal chemistry techniques. ($620)	No activity. ($0)	No activity. ($0)
Systems for Industrial Fuel Gas Production	Continued theoretical studies on coal gasifiers and gasification systems needed for design of an optimized systems/technology data base. ($445) Continued development of concepts and data for a solid state electrolyte oxygen separator ($480). Completed development of promising alternatives to components, instruments, etc., that have high failure rates, capital costs or high maintenance costs. Continued development of materials to enhance capability in severe gasification conditions ($577). (Total $1,502)	Completed theoretical studies on coal gasifiers and gasification systems needed for design of optimized systems and continued fluidization research ($703). Continued efforts to develop more economical methods for production of oxygen in large quantities--advanced solid state zirconia system to PDU stage of study ($350). Perform in-house studies on system integration. ($182) (Total $1,235)	Continue development of a potentially lower cost method for oxygen production ($180). Continue advanced instrumentation research on slipstream gasifier testing ($220). Continue operation of METC fluid-bed gasifiers to provide data on system integration and optimum configuration of subsystems ($600). (Total $1,000)
Systems for Synthesis Gas Production	Continued efforts directed at identifying and determining the potential of new techniques for separation of complex gas mixtures to include selective removal of impurities. ($360) Continued to provide engineering analyses and systems evaluation capability for joint DOE/GRI Coal Gasification Program utilizing FY 84 funding. ($0) (Total $360)	Continued studies using coal based sorbents and zeolites in pressure swing adsorption for separation of gases. Continued development of low cost, highly selective permeable membranes for hydrogen separation ($235). Continued to provide engineering analyses and systems evaluation capability for the joint DOE/GRI Coal Gasification Program ($561). (Total $796)	Continue DOE/GRI technical evaluation and engineering analyses of synthesis gas systems; continue studies on low cost hydrogen separation using novel concepts including membranes; and continued investigations on low cost shift catalysts. ($1,160)

III. Surface Coal Gasification (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Systems for Synthesis Gas Production (cont'd)	Completed slip stream studies on promising systems for effluent cleanup and control. (Total $447)	No activity. ($0)	No activity. ($0)
	Continued study of novel approaches to use microorganisms for removing trace amounts of organic contaminants in waste water. ($236)	Completed study of novel approaches to use microorganisms for removing trace amounts of organic contaminants in waste water. (Prior year funding)	No activity. ($0)
	Completed studies on environmental aspects of coal gasification to include waste management, effluent control systems and the impact of gasification plant environment on worker health. ($346)	Completed environmental evaluation and analysis studies at UNDERC. Total program funding is $957, of which $11 is from prior year funding. ($946) Of this amount, $838 is proposed for rescission.	No activity. ($0)
Systems for Coproducts Production	Continued studies on advanced, staged, concurrent, rapid rate reactors. Completed studies on approaches to utilization of semi-volatile catalysts, sulfur removal compounds within the gasifier and their potential to vary the product spectrum and/or provide more economical, environmentally responsive systems. ($480) Begin studies on the use of advanced gasifier concepts, mild gasification techniques, pretreatment processes, new catalysts, processing chemistries, and their potential applications in the economic production, upgrading, and use of coproducts. ($1,904) Issued PRDA to examine gasifier operating conditions in context of characteristics of selected high volatile coals known to produce higher yields of liquids to establish optimum product yields. ($480) (Total ($2,864)	Completed studies on advanced staged, concurrent rapid rate reactors to enhance data base on rapid rate pyrolysis. Continue characterization of char during devolatilization. ($309) Completed essential studies leading to economic production, upgrading and use of coproducts. Initiated studies for new fuels from mild gasification techniques. Completed densely loaded flow and attrition studies, fluidization research and component development research ($2,250). Investigated new and novel methods for sampling and analyzing organics, sulfur species, nitrogen, trace elements, etc., and studied ways to reduce toxicity of oils and tars ($186). Initiated environmental assessment of those processes found suitable for production of new fuel forms ($170). (Total $2,915)	Continue investigation of rapid coal devolatilization for maximum liquid yields; studies on upgrading of coal derived liquids; and systems analysis and economic evaluation of mild gasification processes; continue investigation of novel electrochemical process for production of coal liquids; multi-solid fluid bed phenomena investigations; and, development of recirculating catalysts for mild gasification process. ($1,000)

III. Surface Coal Gasification (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Systems for Coproducts Production (cont'd)	Completed studies on gasifier performance and the resulting impact on yields of condensible liquids and char and began to determine their suitability for use in advanced heat engines ($375). Continued development of analytical models to improve the quality of the data base and to increase the ability of end user groups to analyze new systems ($335). (Total $710)	Completed investigation of parameters controlling use of minimally cleaned gasifier coal products as fuels for advanced heat engines ($50). Completed development of analytical models for computer based systems analysis of advanced gasifier systems and prepare environmental information for entry ($200). (Total $250)	No activity. ($0)
	No activity. ($0)	Completed investigations into production testing of mild gasification processes at UNDERC. ($388) Of this amount, $344 is proposed for rescission. ($388)	No activity. ($0)
	No activity. ($0)	Initiated and completed research for high BTU defense fuels. ($500)	No activity. ($0)
	Completed identification, development and evaluation of hybrid gasifier/gasification concepts. ($384)	No activity. ($0)	No activity. ($0)
	Completed studies on the interrelationship between gasifier bed composition and operational parameters on the composition of products produced. ($292)	No activity. ($0)	No activity. ($0)
Great Plains Project	Continued management of the loan guarantee and monitoring of the Great Plains project. ($2,653)	Continued management and monitoring of the Great Plains project. ($437)	Complete post operations assessments and information archiving ($350). Provide for administrative closeout expenses ($150). (Total $500)
Total, Surface Coal Gasification	$41,323	$24,655	$5,800

IV. Construction Projects

- None

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

PETROLEUM RESEARCH AND DEVELOPMENT

VOLUME 4

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DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Advanced Process Technology

FY 1987 Appropriation enacted	$ 3,785
Advanced Exploratory Research	
o Reduce research on fundamental petroleum chemistry and geoscience	-404
o Reduce research on extraction technology and development of advanced instrumentation to measure reservoir characteristics and thermal fronts	-1,079
o Increase fuels testing research	+3
o Reduce environmental mitigation research	-227
Subtotal	-1,707
Arctic and Offshore Research	
o Reduce effort on Arctic/Offshore data base; increase laboratory and field research on interaction of ice with man-made structures	-78
FY 1988 Congressional Budget Request	$ 2,000

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

PETROLEUM

I. Preface: Advanced Process Technology

The Advanced Process Technology (APT) Program pursues new concepts to achieve quantum increases in efficiency and cost reduction of recovery techniques for oil, gas, and oil shale. In addition, the program provides for fundamental research that is relevant to oil, gas, and shale oil. It includes acquisition and dissemination of scientific information to enhance the recovery of fossil energy resource from the Alaskan Arctic and from deep water areas. Three goals of the APT Program are: (1) to conduct fundamental research relevant to recovery of oil, gas, and shale oil; i.e., the development of tools and techniques to measure and predict important properties and phenomena and to obtain the critical, fundamental data on these recovery processes; (2) to pursue application of discoveries from the frontiers of science and/or as yet unexplored new concepts which may achieve quantum increases in the recovery of oil, gas, and shale oil resources; and, (3) to develop a fossil energy-related knowledge base that will improve the economics of fossil fuel production in the Alaskan Arctic and, in effect, expand the reserves.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Advanced Exploratory Research	$4,486	$3,290	$1,583	-52
Arctic and Offshore Research	1,037	495	417	-15
Total, Advanced Process Technology	$5,523	$3,785 1/	$2,000	-47

1/ Of this amount, $116,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
National Institute for Petroleum and Energy Research	$2,318	$1,653	$1,300

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Advanced Exploratory Research	Completed feasibility analysis phase of research into the novel use of microorganisms to enhance oil recovery; research activities include field testing of promising microbes, nutrient requirements, transport characteristics, and oil release mechanisms. Work performed at various universities. ($566)	Activity transferred to EOR program for further development. ($0)	No activity. ($0)
	Continued fundamental petroleum geoscience and chemistry research focusing on physical and chemical characterization studies of heavy oil; thermodynamic measurements; shale oil and tar sands bitumen studies and fuel storage and handling. Work performed by various universities and NIPER. ($1,927)	Continued fundamental petroleum geoscience and chemistry research focusing on physical and chemical characterization studies of heavy oil; thermodynamic measurements; shale oil and tar sands bitumen studies and fuel storage and handling. Work performed by NIPER, WRI, and National Laboratories. ($1,259) Of this amount, $66 is proposed for rescission.	Continue a program of fundamental studies including crosscutting research in petroleum chemistry focusing on physical and chemical characterization of the high boiling range fraction of crude oils; identify stability and contaminant problems associated with processing techniques applied to petroleum, tar sands and oil shale. Work performed at NIPER. ($855)

III. Advanced Process Technology (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Advanced Exploratory Research (cont'd)	Continued ongoing extraction technology research focusing on reservoir characteristics and development of advanced instruments to measure thermal fronts, natural fractures in reservoirs, and reservoir heterogenities. Work performed by various national labs. ($520)	Continued extraction technology research focusing on reservoir characteristics and development of advanced instruments to measure thermal fronts, natural fractures in reservoirs, and reservoir heterogeneities. Work performed by National Laboratories, NIPER, universities and industry. ($1,362)	Continue research on geoscience and extraction technology and development of advanced instrumentation to measure reservoir characteristics and thermal fronts. ($283)
	Continued fuels testing research, correlation of fuels composition and processing needs, and predictive models of process to composition. Work performed by NIPER. ($883)	Continued fuels testing research, correlation of fuels composition and processing needs, and predictive process models. Work performed by NIPER. ($112)	Continue fuels research, correlation of fuels composition and processing needs for predictive models. ($115)
	Continued studies which focused on mitigation of aquifer damage. Completed extraction related studies focusing on subsidence problems, separation of toxic metals from heavy crudes, and investigation of volatilzation of organic compounds from synfuels waste waters. Work performed by various national labs, universities and WRI. ($590)	Continued extraction related aquifer contamination studies and other environmental mitigation research. Includes work performed by WRI. ($557) Of this amount, $50 is proposed for rescission.	Continue research on pollutants in aquifiers adjacent to oil, gas and shale in-situ recovery operations, and development of mitigation strategies. Work performed by NIPER. ($330)
Arctic and Offshore Research	Continued the update and maintenance of the Arctic/offshore oil and gas research data base. Work performed by industry. ($839)	Continued acquisition of data on ice island motion, prediction and effects on structures, development of the Arctic/offshore fossil energy related data base and program planning, evaluation, and monitoring efforts. ($495)	Continue acquisition of data on ice island motions and ice floe interactions with structures, and development of the Arctic/ Offshore oil and gas research data base. ($417)
	Continued fundamental ice research to characterize size, composition, degree of consolidation, temperature and salinity profiles. Work performed by various universities and federal laboratories. ($198)	No activity. ($0)	No activity. ($0)
Total, Advanced Process Technology	$5,523	$3,785	$2,000

IV. Construction Projects

o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Enhanced Oil Recovery

FY 1987 Appropriation enacted	$11,211
Heavy Oil	
o Reduced efforts for steam additive mechanisms, mobility control and foam generation studies	-1,125
o Reduced funding for joint research efforts with Venezuela and Mexican heavy oil characterization, reservoir modeling and thermal recovery strategies	-375
o Completed alkaline flooding studies	-250
o Initiate geoscience characterization program	+500
o Initiate research into novel extraction technologies	+500
o Initiate fundamental chemical, physical and thermodynamics studies	+500
Subtotal	-250
Light Oil	
o Continue efforts at the National Institute for Petroleum and Energy Research for light oil recovery efforts	+2,650
o Completed post test analysis of EOR field trials. Continued geologic heterogeneities studies	-1,100
o Continued microbiological studies and initiated additional advanced process analysis research	+500
o Reduced efforts concerning basic studies of rock-fluid interaction phenomena and behavior	-900

Enhanced Oil Recovery (Cont'd)

Light Oil (Cont'd)

o Reduced efforts for studies of CO_2 and other gas flooding concepts with emphasis on mobility control	-700
o Reduced efforts for EOR processes research	-461
Subtotal	-11

Tar Sands

o Research efforts related to tar sands were discontinued in FY 1988	-1,650
FY 1988 Congressional Budget Request	$ 9,300

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

PETROLEUM

I. Preface: Enhanced Oil Recovery

Enhanced Oil Recovery (EOR) represents the development of sophisticated technologies designed to increase the recovery of oil from a reservoir and ultimately allow for the recovery of a significant amount of oil that remains in the ground after "conventional" techniques have been applied. Conventional techniques are defined to include natural forces or the injection of water or natural gas into the reservoir (e.g., waterflooding and repressurization by reinjection of associated gas). Enhanced oil recovery techniques include the injection of heat and/or fluids and gases into the reservoirs to achieve a physical or chemical change that will facilitate further oil recovery.

Enhanced oil recovery represents a technology that can fill the gap between now and the critical time when the nation will likely rely more extensively on synthetic fuels (also being developed by our Oil Shale, Tar Sands, and Liquefaction programs). To achieve their goals, the Department of Energy has developed a program to conduct generic technology base R&D activities; develop fundamental knowledge that can lead to improved and new process concepts; and to assist industry in obtaining a better understanding of the mechanisms and behavior of advanced and novel EOR processes for the recovery of presently unrecoverable light oil, heavy oil and tar sand resources.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Heavy Oil	$2,756	$2,350	$2,100	-11
Light Oil	7,381	7,211	7,200	-.2
Tar Sands	1,317	1,650	0	-100
Total, Enhanced Oil Recovery	$11,454	$11,211 1/	$9,300	-17

1/ Of this amount, $248,000 is proposed for rescission.

II. B. Major Laboratory and Facility Maintenance (obligations)

National Institute for Petroleum and Energy Research	$3,792	$3,729	$3,700

Program Activity	FY 1986	FY 1987	FY 1988
Heavy Oil	Continued studies of multiphase fluid flow using steam with foam for mobility control, foam generation and stability, and downhole steam quality. ($1,475)	Continued studies of steam additive mechanics and variables affecting mobility control and sweep efficiency. Conducted foam generation and stability studies. ($1,525)	Continue basic research at the National Institute for Petroleum and Energy Research in mobility control mechanisms of steamflood additives for increasing sweep efficiency, foam generation and stability, and correlating chemical/physical reservoir properties with specific additive behavior. ($400)

III. Enhanced Oil Recovery (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Heavy Oil (Cont'd)	Continued joint research with Venezuela and Mexico on heavy oil characterization, thermal recovery evaluation, subsidence prediction and reservoir modeling. ($561)	Continued joint research with Venezuela and Mexico on heavy oil characterization, reservoir modeling and thermal recovery strategies. ($575)	Continue cooperative research with Venezuela and Mexico on a task shared basis through the National Institute for Petroleum and Energy Research in petroleum characterization and recovery; conduct cooperative research with the oil producing states to mitigate production declines; and conduct the related planning, technical and analytical assessments. ($200)
	Continued investigation of kinetics of oxygen-enriched in situ combustion and research on the role of alkalines in EOR. ($720)	Completed studies on variables in alkaline flooding in EOR, expanded in-situ combustion efficiency and reaction front studies. ($250)	No activity. ($0)
	No activity. ($0)	No activity. ($0)	Initiate a geoscience characterization program as a means for overcoming reservoir heterogeneity constraints to thermal sweep efficiencies and effective fluid displacement and recovery. ($500)
	No activity. ($0)	No activity. ($0)	Inititate research in novel extraction approaches to presently deemed unrecoverable heavy oil resources through alternate reservoir access methods, advanced techniques for re-stimulating mature wells such as MEOR and other new technologies. ($500)
	No activity. ($0)	No activity. ($0)	Initiate fundamental studies on the chemical, physical and thermodynamic properties and behavior of reservoir and injection fluid interactions. ($500)
Light Oil	Continued fundamental studies on surfactant behavior in EOR concepts and applications. ($1,818)	Investigated high temperature, stable polymer systems and continued fundamental surfactant studies. ($1,150)	Continue broad based program of research at the National Institute for Petroleum and Energy Research in light oil recovery; conduct cooperative research with oil producing states to mitigate production declines; and conduct the related planning, technical and analytical assessments. ($3,800)

III. Enhanced Oil Recovery (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Light Oil (Cont'd)	Conducted post-field test analyses of EOR trials and continued studies of geologic heterogeneities and other characteristics on EOR process shortcomings. ($1,537)	Completed post-test analyses of EOR field trials. Continued and expanded studies of geologic heterogeneities and other characteristics on EOR process shortcomings. ($1,700)	Initiate a geoscience effort to address geological parameters impacting EOR including determination of residual oil saturation in the zones where EOR fluids are injected; quantification of the micro and macroscopic heterogeneities that cause channeling around targeted residual oil; development of analytical and diagnostic techniques to characterize reservoirs. ($600)
	Formerly part of APT program.	Continued environmental study of microbial EOR processes. ($100)	Continue research in advanced process analysis to include systematic microbiological studies and exploring the feasibility of other novel methods of access to as well as extraction of residual oil resources. ($600)
	Conducted basic studies of rock-fluid interaction phenomena and behavior. ($1,393)	Conducted basic multi-phase flow wettability studies to understand EOR process mechanisms using both NIPER and university investigations. Expanded the investigations conducted by other performers. ($1,500)	Continue fundamental studies of three-phase fluid movement in reservoirs, rock/fluid interaction phenomena including chemical absorption and desorption, relative permeability, wettability effects, ion-exchange characteristics, surface chemistry and chemical potential of sedimentary rocks as a foundation so industry can design efficient, effective chemical recovery systems. ($600)
	Continued studies of CO2 displacement mechanisms including viscous channeling and mobility control concepts. ($1,192)	Continued studies of CO2 and other gas flooding concepts with emphasis on mobility control. Conducted research in CO2 process fundamentals and mathematical modeling performed at METC, NIPER, and universities. ($1,300)	Continue an in-house program of research in gas miscible, CO2 recovery with emphasis on understanding reservoir heterogeneity effects on gas flooding, development of mobility control strategies to affect significant increases in sweep efficiency, and on fundamental studies to identify displacement mechanisms requisit to efficient, effective and predictable application of CO2 and other gas recovery methods. ($600)
	Continued university basic and novel extraction concept studies. ($1,441)	Continued fundamental research activities at eight universities in chemical EOR processes. ($1,461)	Solicit small cooperative industry field tests to rapidly demonstrate promising lab scale EOR concepts particularly applicable to mature light oil fields in production decline. ($1,000)

III. Enhanced Oil Recovery (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Tar Sands	Phased out laboratory tube and block reactor test of recovery process relationships for use in predictive model formulation for tar sands recovery. ($777)	Completed renewed Western Research Institute studies on in-situ thermal recovery parameters, process environmental mitigation and advanced concepts of in-situ and surface extraction. ($621) Of this amount, $248 is proposed for rescission.	No activity. ($0)
	Continued joint empirical test program with Canada for assessing advanced concepts of remote tracking of thermal fronts for control of in situ combustion process of tar sands recovery, and cooperative development of methodology for tar sand resource and bitumen analysis. ($411)	Completed cooperative research with Canada in remote tracking of thermal fronts, and resource analysis, and carry out planning and technical assessments in support of program activities. ($200)	No activity. ($0)
	Completed fundamental process chemistry and environmental studies. ($129)	Initiated investigation of advanced surface extraction concepts; expanded basic analysis of in situ process parameters; continued data base construction; and completed basic retort efficiency and advanced chemical upgrading studies. ($829)	No activity. ($0)
Total, Enhanced Oil Recovery	$11,454	$11,211	$9,300

IV. Construction Projects

- None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Oil Shale

FY 1987 Appropriation enacted	$10,967
Oil Shale Technology Base	
o Completed research specific to eastern shales	-3,453
o Reduced level of effort on systems analyses, reference shale studies including control-maintenance of the shale bank, and oil shale data bases	-779
o Eliminated WRI Efforts concerned with in-depth reference shale characterization research and exploration of advanced processes	-1,550
o Completed extraction research projects conducted by INEL	-1,000
o Completed research under International Agreement with Israel	-55
o Closed out in rock fragmentation and in situ retorting research	-300
Subtotal	-7,137
Environmental Mitigation	
o Completed contract research specific to environmental problems of eastern shales	-547
o Eliminated WRI related research to develop experimental data needed to determine chemical stability of vast spent shale piles	-1,921
o Reduced research on process waste streams, technical and analytical assessments and data base maintenance, and terminate research under an International Agreement with Israel	-407
Subtotal	-2,875
FY 1988 Congressional Budget Request	$ 955

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

PETROLEUM

I. Preface: Oil Shale

Oil shale technology development requires the advancement of extraction and conversion processes to convert oil shale to a suite of liquid fuels. Oil shale is a major resource base usable between now and the critical time when the nation will likely rely more on synthetic fuels. Technology advancements in shale oil recovery which lower the economic recovery threshold toward 10 gallons per ton could make the U.S. independent of the risk of relying on foreign imports. To accomplish this goal, the Department of Energy has developed a program to provide a sound technologic basis for reduction of economic and environmental constraints to industrial development of the U.S. oil shale resources and to increase the amount of resource that may be used economically. The program will focus on basic research using reference shales to systematically study the chemistry, kinetics, and emissions related to eastern and western shale processing.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Oil Shale Technology Base	$8,447	$7,792	$655	-92
Environmental Mitigation	3,689	3,175	300	-91
Total, Oil Shale	$12,136	$10,967 1/	$955	-91

1/ Of this amount, $1,388,000 is proposed for rescission.

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
Idaho National Engineering Laboratory	$953	$1,000	$0
Lawrence Livermore Laboratory	$2,503	$1,700	$0
Hycrude Corporation	$1,200	$1,500	$0
Western Research Institute	$2,795	$3,471	$0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Oil Shale Technology Base	Continued FY 85 efforts on eastern shales. Includes eastern and western shale retorting parameters, and product characteristics related to beneficiation and hydroretorting. ($1,903)	Completed specific eastern shale research resulting from FY 85 unsolicited proposals in the areas of hydroretorting and in situ processing. ($1,450) Conducted additional specific eastern shale research contracts in areas of beneficiation with hydroretorting, and fluidized beds with and without heatpipes. Redirected research at LLNL to specific eastern shale studies with hot solids transfer. ($2,003) Total ($3,453)	No activity. ($0)

III. Oil Shale (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Oil Shale Technology Base (Cont'd)	Continued developing a systems analyses capability to enable assessment from mining to spent shale disposal. ($399)	Continued developing a systems analysis capability to enable assessment from mining to spent shale disposal. ($277)	Integrated with METC in-house work.
	Continued characterization studies of reference shales obtained in FY 85. Continued experiments with reference retort systems to provide data for modifying and developing chemical, physical, and economic models of generic, moving-bed processes. ($2,214)	Continued experiments with reference shales in various generic solids recycle retort systems to provide data for modifying and developing chemical, physical, and economic models. Maintained reference shale bank activities including characterization and distribution of shales to program participants. ($1,107)	Continue an integrated program of research at METC and LLNL, develop the experimental data, and associated models and systems analysis capabilities required by industry to determine how raw shale composition and process conditions affect the quantity and quality of product and air, water, and solid waste emissions. ($655)
	Continued development and maintenance of an oil shale data base. ($144)	Continued development and maintenance of an oil shale data base. ($50)	Integrated with METC in-house work above.
	No activity. ($0)	Augmented fluidized bed studies under an international agreement with Israel, and conducted planning, technical and analytical assessments. ($55)	Included in Environmental Mitigation subactivity in FY 1988 request.
	Continued experiments to evaluate, modify, and/or develop predictive models for oil shale fragmentation and in situ (low-void) retorting. ($2,834)	Close out fragmentation and in-situ (low-void) retorting research at SNL. ($300)	No activity. ($0)
	No activity. ($0)	Initiated research at WRI to perform characterization of selected reference shales; establish the criteria for efficient, effective in-situ oil shale recovery; and to explore advanced processes. ($1,550) Of this amount, $694 is proposed for rescission.	No activity. ($0)
	Initiated and completed a study of research needs/activities for establishing an extraction research project through the Idaho Operations Office. ($953)	Established an extraction research project through the Idaho Operations Office and INEL. ($1,000)	No activity. ($0)
Environmental Mitigation	Completed studies of siting methodology. ($376)	No activity. ($0)	No activity. ($0)
	Continued development of environmental data base. ($144)	Continued development of environmental data base. ($33)	Integrated with METC in-house work below.

III. Oil Shale (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Environmental Mitigation (Cont'd)	Completed research on nitrogen emissions and the capture of sulfur by western oil shale compounds under varying process conditions. ($192)	No activity. ($0)	No activity. ($0)
	No activity. ($0)	Continued specific eastern shale research on chemical stability in engineering-scale lysimeters, resulting from prior competitive solicitation awards to the Kentucky Center for Energy Research Laboratory (KCERL) and the Wyoming Water Research Center (WWRC) and solicited new concepts for environmental research on eastern shales. ($547)	No activity. ($0)
	No activity. ($0)	Initiated research at WRI to develop the experimental data for determining the chemical stability of spent shale piles. Studies included the conversion process, post process treatment, process water composition, etc., impact on release of pollutants (and what pollutants) to the air and hydrology. ($1,921) Of this amount, $694 is proposed for rescission.	No activity. ($0)
	Identified and quantified major and trace element emissions in gases, liquids, and solids from reference retorts as a function of process parameters such as time, temperature, shale particle size and composition, and retort gas composition. Continued analytical methods development as necessary. Continued studies of critical questions associated with codisposal and spent shale pile stability. ($2,977)	Identified and quantified major and trace element emissions in gases, liquids and solids from reference shales as a function of process parameters. Continued analytical methods development with emphasis on nitrogen and sulfur studies from eastern reference shales. ($427) Supported environmental research and health and safety research under international agreement with Israel and conducted planning, technical and analytical assessments. ($247) Total ($674)	Continue research to identify and quantify trace element emissions and how they partition in the product and waste streams as a function of process condition and shale composition; conduct planning, technical and analytical assessments. ($300)
Total, Oil Shale	$12,136	$10,967	$955

IV. Construction Projects

o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Unconventional Gas Recovery

FY 1987 Appropriation enacted	$ 8,009
Eastern Gas Shales	
o Continued in-house effort focused on maintaining and updating the technical data base and evaluating future research thrusts	-547
Western Tight Gas Sands	
o Continued Multiwell test and continued in-house efforts to evaluate and integrate into the information system the data obtained at the multiwell site	-5,099
Environmental and Advanced Research	
o Completed diagnositc field tests and conducted the data analysis necessary to ascertain the extent and development potential of gas hydrates and deep source gas	-763
FY 1988 Congressional Budget Request	$ 1,600

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

GAS

I. Preface: Unconventional Gas Recovery

Unconventional Gas Recovery (UGR) represents the development of advanced technologies for the extraction of natural gas from currently unrecoverable gas resources. The resources for UGR include lenticular tight gas sands, Eastern Devonian shales, gas hydrates, deep source gas, and coalbed methane. Lenticular tight gas sand resources are gas bearing formations characterized by low permeability and limited reservoir extents. Although tight gas sands occur throughout the U.S., the principal resources are located in Western basins. The principal gas bearing Devonian shales of the U.S. are contained in three eastern basins consisting of the Appalachian Basin, the Michigan Basin, and the Illinois Basin. This resource exhibits low permeability and porosity, and characteristically has an extensive system of natural fractures of varying degress. Areas of high natural fracture density tend to offer the greatest potential for economic gas production. Gas hydrates are solid ice-like compounds in which gas molecules are entrapped and bound to water molecules. Gas hydrates have been found occurring naturally in sediments directly beneath and within thick permafrost zones and in deep ocean areas. Coalbed methane is found trapped within the micropores of coal or in the natural fractures of coalbeds. Deep source gas is currently believed to consist of methane originating deep within the earth's crust. This source remains little more than a scientific curiosity and will continue as such until more fundamental knowledge is acquired.

Gas resources recovered by UGR techniques have the potential to make a significant contribution to the nation's future economy by augmenting current conventional supplies. To further develop this as yet underutilized energy resource, the Department of Energy has developed a program to reduce the uncertainty surrounding the potential magnitude of reserves of the unconventional gas resources and the conditions under which they will be produced; develop and improve extraction technologies to the point of technical readiness for private sector development; and, transfer all technical and economic data to industry.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Eastern Gas Shales	$938	$847	$300	-65
Western Tight Gas Sands	5,393	5,399	300	-94
Environmental and Advanced Research	2,172	1,763	1,000	-43
Total, Unconventional Gas Recovery	$8,503	$8,009	$1,600	-80

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
Sandia National Laboratory	$4,142	$3,700	$0
EG&G, Inc.	$791	$530	$1,175

Unconventional Gas Recovery (Cont'd)

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Eastern Gas Shales	Continued efforts with the acquisition of shale reservoir property data (producing intervals, flow rates, etc.) in various locations within the Appalachian, Illinois and Michigan Basins, utilizing prior year funding. ($0)	Completed testing, data analysis, and reports for reservoir property data utilizing prior year funding. ($0)	No activity. ($0)
	Continued research efforts in increasing longevity of oil production from Devonian shale reservoirs, utilizing prior year funding. ($0)	Completed research efforts in increasing longevity of oil production from Devonian shale reservoirs utilizing prior year funding. ($0)	No activity. ($0)
	Continued development of Eastern Gas Shale production data base; continued reservoir model refinement activity. ($303)	Continued development of Eastern Gas Shale production technology base; continued special geoscience investigations, system analyses, planning, evaluation and technology transfer. ($347)	Continue in-house support to maintain and update the technical data base and research with associated reservoir and stimulation models; continue systems analysis in support of production strategy development. ($300)
	Continued effort by drilling a directional borehole to test a maximum recovery efficiency concept. ($635)	Completed effort by stimulating, testing and producing from a directional borehole. ($500)	No activity. ($0)
Western Tight Gas Sands	Continued fracture stimulation research and production testing of lenticular tight gas sands. ($4,216)	Completed fracture stimulation research and production testing of lenses at MWX facility. Completed diagnostics testing at MWX site, and extrapolated MWX findings to other areas utilizing developed geological information. ($4,150)	No activity. ($0)
	Continued geologic/engineering studies of Uinta and Greater Green River Basins. Efforts conducted by USGS in Colorado. ($253)	Completed further geological engineering studies of Unita and Greater Green River Basins and analyzed and summarized the data collected. ($300)	No activity. ($0)
	Continued supporting research activities in modeling, fracture diagnostics, and geophysical instrumentation. METC conducted the effort utilizing numerous contractors & universities. ($924)	Continued supporting research modeling, systems analysis, planning, evaluation, and data base development. Conducted remote lens studies, CT core analysis efforts and university studies of MWX data. ($949)	Continue in-house research on reservoir and stimulation model application; systems analyses; data base maintenance and expansion. Modeling focuses on integration of multiwell results and on regional studies of production patterns and reservoir behavior. ($300)

III. Unconventional Gas Recovery (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Environmental and Advanced Research	Continued resource identification and evaluation of gas hydrates and deep source gas. Efforts were conducted by METC and USGS, utilizing various contractors. ($885)	Continued resource identification and evaluaton of gas hydrates and deep source gas. Conducted planning and resource evaluation of gas hydrates and deep source gas. ($513)	Continue in-house geologic, geophysical and geochemical studies in support of a program to explore deep source gas generation potential of organics subducted at techtonic plate margins. ($300)
	Completed deep source gas research on gas detection/differentiation system. ($245)	No activity. ($0)	No activity. ($0)
	Continued lab analysis of hydrate core and modeling research. ($192)	Completed lab analysis of hydrate core and modeling research. ($200)	No activity. ($0)
	Conducted geochemical and geophysical diagnostic tests for gas hydrates on the North Slope of Alaska. ($586)	Completed geochemical and geophysical diagnostic tests for gas hydrates on the North Slope of Alaska. ($650)	No activity. ($0)
	Continued evaluation and development of gas hydrate extraction/production techniques and data analysis of environmental assessments. ($264)	Continued planning, evaluation and development of gas hydrate extraction/production techniques and data analysis of environmental assessments. Investigated conversion of natural gas to liquids processes. ($400)	Continue research to explore on a fundamental basis geophysical and geochemical properties of gas hydrates and to examine gas hydrate recovery strategies based on an understanding of the gas release mechanisms. Conduct in-house technology assessment of processes to convert natural gas to liquids. ($700)
Total, Unconventional Gas Recovery	$8,503	$8,009	$1,600

IV. Construction Projects

o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Program Direction and Management Support

FY 1987 Appropriation enacted	$61,456
Headquarters Program Direction	
o Increase in funding for salaries and benefits at Headquarters. Includes an increase to cover payroll and retirement costs	+458
o Increase in funding for travel in support of program activities	+24
o Contract services decrease in funding for printing, support services, computer services, conference fees, etc.	-3,930
Subtotal	-3,448
ETC Program Direction	
o Decrease in funding for salaries and benefits supporting 100 fewer FTE's at METC, PETC and BPO	-3,922
o Decrease in travel funds for ETC staff associated with general management, support and program direction	-202
o Contract services decrease in funding that supports facility operations maintenance, finance, administrative support and other cost not appropriately chargeable to R&D projects	-15,228
Subtotal	-19,352
Federal Inspector for the Alaskan Natural Gas Transportation System	
o Increase in funding for related expenses for administrative and support functions	+9
FY 1988 Congressional Budget Request	$38,665

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

PROGRAM DIRECTION AND MANAGEMENT SUPPORT

I. Preface: Program Direction and Management Support

This activity provides funding for salaries, benefits and overhead expenses for the management of the Fossil Energy program at Headquarters, and the Energy Technology Centers. The Headquarters staff is responsible for overall program direction which implements DOE policy and communicates that policy to the Energy Technology Centers, sets program objectives, develops program plans and evaluates alternative program strategies, develops and defends budget requests to the Office of Management and Budget and to the Congress, approves procurement plans, monitors work progress, evaluates projects, and approves revisions in work plans as required to attain program goals. The Energy Technology Centers support day-to-day project management functions for assigned programmatic areas including contract and National Laboratory monitoring, development and maintenance of project budget, and procurement plans, and other activities related to program and site support. The Office of the Federal Inspector for the Alaska Natural Gas Transportation System is responsible for coordinating all Federal activities pertaining to the construction and initial operation of the pipeline. The office of the Federal Inspector also enforces federal laws and permits, and monitors activities that affect the system.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Headquarters Program Direction:				
Salaries and Benefits	$7,916	$8,418	$8,876	+5
Travel	432	434	458	+6
Contract Services	2,467	5,431	1,501	-72
Subtotal, Headquarters Program Direction	10,815	14,283	10,835	-24
ETC Program Direction:				
Salaries and Benefits	14,374	17,534	13,612	-22
Travel	786	904	702	-22
Contract Services	24,105	28,514	13,286	-53
Subtotal, ETC Program Direction	39,265	46,952	27,600	-41
Federal Inspector for the Alaskan Natural Gas Transportation System	511	221	230	+4
Total, Program Direction	$50,591	$61,456	$38,665	-37

II. B. Major Laboratory and Facility Funding

Morgantown Energy Technology Center	$9,992	$13,546	$9,112
Pittsburgh Energy Technology Center	$8,831	$11,200	$9,199
Bartlesville Project Office	$953	$1,970	$1,089
EG&G, Inc.	$7,218	$10,028	$4,700
Boeing Computer Services	$0	$1,800	$0
Burns and Roe, Inc.	$5,799	$7,600	$3,500

Program Direction and Management Support (Cont'd)

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Headquarters Program Direction Salaries/Benefits	Provided funds for 136 FTEs at Headquarters associated with general management and support and technical program direction. ($7,916)	Provided funds for 135 FTEs at Headquarters, which will restore the legislative floors. ($8,418)	Provide funds for 130 FTEs at Headquarters. This staff implements and communicates policy to the ETC's, sets program objectives, develops program plans and evaluates alternative strategies; develops and defends budget requests; approves procurement plans, monitors work programs. ($8,876)
Travel	Provided funds for 136 FTEs in support of coordination of the activities above. ($432)	Provided funds for 135 FTEs in support of the Program Direction and Management Support activities. ($434)	Provide funds for 130 FTEs in support of the activities stated above. Both domestic and international travel is conducted. ($458)
Contract Services	Provided for contractual services that are generic to the entire FE program. Included are items such as Historically Black Colleges, printing, support services, computer services, conferences, etc. ($2,467)	Provided for contractual services that are generic to the entire FE program. Included are items such as Historically Black Colleges, printing, support services, computer services, conferences, etc. ($5,431)	Provide for contractual services that are generic to the entire FE program. Included are items such as printing, computer services, technical support services, conferences, etc. ($1,501)
ETC Program Direction Salaries/Benefits	Provided funds for ETC staff of 307 FTEs. Activities of the staff include contract and lab monitoring; development and maintenance of project, budget and procurement plans, and other activities related to program and site support. ($14,374)	Provided funds for ETC staff of 340 FTEs. Activities of the staff include contract and lab monitoring; development and maintenance of project, budget and procurement plans, and other activities related to program and site support. ($17,534)	Provide funds for ETC staff of 240 FTEs. Activities of the staff include contract and lab monitoring; development and maintenance of project, budget and procurement plans, and other activities related to program and site support. ($13,612)
ETC Program Direction (cont'd) Travel	Provided funds for 307 FTEs in support of the coordination of the above activities in the attainment of program goals, both on the domestic front and abroad. ($786)	Provided funds for 340 FTEs in support of the coordination of the above activities in the attainment of program goals, both on the domestic front and abroad. ($904)	Provide funds for 240 FTEs in support of the coordination of the above activities in the attainment of program goals, both on the domestic front and abroad. ($702)
Contract Services	Provided funds for facility operations, maintenance, finance and administrative support and other costs not appropriately chargeable to R&D projects, in support of this level of FTEs. ($24,105)	Provided funds for facility operations, maintenance, finance and administrative support and other costs not appropriately chargeable to R&D projects, in support of this level of FTEs. ($28,514)	Provide funds for facility operations, maintenance, finance and administrative support and other costs not appropriately chargeable to R&D projects, in support of this level of FTEs. ($13,286)

III. Program Direction (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Federal Inspector for the Alaskan Natural Gas Transportation System	Completed review of Frost Heave Program documents and activities; continued long-term Frost Heave research using prior year funding. ($0)	No activity. ($0)	No activity. ($0)
	Continued to perform routine administrative and support functions. ($432)	Provided funds for salaries and related expenses for administrative and support functions. ($192)	Provide funds for salaries and related expenses for administrative and support functions. ($211)
	Continued to assess developments in U.S. and Canadian energy markets and maintained liaison with project sponsors, producers, other government agencies, State of Alaska and Canadian government. ($79)	Continued to assess developments in U.S. and Canadian energy markets and maintained liaison with project sponsors, producers, other government agencies, State of Alaska and Canadian government. ($29)	Continue to assess developments in U.S. and Canadian energy markets and maintained liaison with project sponsors, producers, other government agencies, State of Alaska and Canadian government. ($19)
Total, Program Direction & Management Support	$50,591	$61,456	$38,665

IV. Construction Projects

- None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

SUMMARY OF CHANGES

Plant and Capital Equipment

FY 1987 Appropriation enacted	$ 3,250
Capital Equipment	
o Eliminate funding for capital equipment in all FE R&D activities conducted at the Morgantown Energy Technology Center, National Laboratories, and the Bartlesville Project Office	-1,020
Construction	
o No funds requested for general plant projects at the energy technology centers and the Bartlesville Project Office	-1,750
FY 1988 Congressional Budget Request	$ 480

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

KEY ACTIVITY SUMMARY

PLANT AND CAPITAL EQUIPMENT

I. Preface: Plant and Capital Equipment

Capital equipment is purchased annually to replace obsolete equipment so that the Energy Technology Centers (ETCs) and the National Laboratories analytical capabilities are constantly being upgraded. General plant projects are essential to the safe, efficient operation of the ETCs and construction is dedicated to a number of improvements, alterations and additions at each of the Energy Technology Centers.

II. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Captial Equipment	$2,865	$1,500	$480	-68
Construction	3,332	1,750	0	-100
Total, Plant and Capital Equipment	$6,197	$3,250	$480	-85

II. B. Major Laboratory and Facility Funding (obligations)

	FY 1986	FY 1987	FY 1988
Morgantown Energy Technology Center	$5,475	$2,032	$0
Pittsburgh Energy Technology Center	$2,660	$1,801	$480

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Capital Equipment	Provided centralized funding for capital equipment needs in all FE R&D activities conducted at the ETC's, National Laboratories, and BPO. ($2,865)	Provided centralized funding for capital equipment needs in all FE R&D activities conducted at the ETC's, National Laboratories, and BPO. ($1,500)	No activity. ($0)
	Acquired mainframe computer at METC. ($2,500 of FY 85 funds)	No activity. ($0)	No activity. ($0)
	No activity. ($0)	No activity. ($0)	Provide ADP equipment at PETC. ($480)
Construction	Provided for general plant projects at ETC's. ($2,855)	Provided for general plant projects at ETC's. ($1,750)	No activity. ($0)
	Provided for planning and design of METC administration wing. ($477)	No activity. ($0)	No activity. ($0)
Total, Plant and Capital Equipment	$6,197	$3,250	$480

IV. Construction Projects

o None

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS SUMMARY
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(89X0213)

FOSSIL ENERGY CONSTRUCTION
(89X0214)

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 26,973	$ 30,158	$ 26,863
11.3 Other than full-time permanent	558	...	...
11.5 Other personnel compensation	675	718	645
11.8 Special personal services payments	27	22	19
11.9 Total personnel compensation	28,233	30,898	27,527
12 Personnel benefits			
12.1 Civilian personnel	3,454	3,784	3,371
13 Benefits for former personnel	56	58	53
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	1,636	1,791	1,593
22 Transportation of things	204	164	139
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	2,443	1,956	1,653
24 Printing and reproduction	159	127	107
25 Other services	283,225	289,575	124,948
26 Supplies and materials	3,672	3,026	2,529
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	6,404	2,088	480
32 Land and structures	5,180	2,199	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	5,899	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$340,565	$335,666	$162,400

NOTE: This exhibit matches the object classification schedule contained in the FY 1988 Budget Appendix at the total obligation line (99.9). However, differences exist by specific object classification line due to the time constraints for submission of data to the OMB automated system for inclusion in the FY 1988 President's Budget Appendix.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(89X0213)

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 26,973	$ 30,158	$ 26,863
11.3 Other than full-time permanent	558	...	...
11.5 Other personnel compensation	675	719	645
11.8 Special personal services payments	27	22	19
11.9 Total personnel compensation	28,233	30,899	27,527
12 Personnel benefits			
12.1 Civilian personnel	3,454	3,784	3,371
13 Benefits for former personnel	56	56	53
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	1,636	1,791	1,593
22 Transportation of things	204	164	139
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	2,443	1,957	1,653
24 Printing and reproduction	159	127	107
25 Other services	283,225	289,575	124,948
26 Supplies and materials	3,672	3,026	2,529
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	5,388	2,088	480
32 Land and structures	4,033	2,066	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	5,899	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$338,402	$335,533	$162,400

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Coal

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 6,831	$ 6,494	$ 6,322
11.3 Other than full-time permanent	131	...	...
11.5 Other personnel compensation	167	159	155
11.8 Special personal services payments	...	7	7
11.9 Total personnel compensation	7,129	6,660	6,484
12 Personnel benefits			
12.1 Civilian personnel	819	815	793
13 Benefits for former personnel	...	10	12
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	204	385	374
22 Transportation of things	3	48	47
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	578	560
24 Printing and reproduction	13	38	36
25 Other services	226,198	223,031	100,251
26 Supplies and materials	1,659	867	843
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	155	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	5,407	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$241,587	$232,432	$109,400

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Control Technology and Coal Preparation

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 1,805	$ 1,723	$ 1,560
11.3 Other than full-time permanent	71	...	...
11.5 Other personnel compensation	62	42	38
11.8 Special personal services payments	...	2	2
11.9 Total personnel compensation	1,938	1,767	1,600
12 Personnel benefits			
12.1 Civilian personnel	230	216	196
13 Benefits for former personnel	...	3	3
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	30	102	92
22 Transportation of things	...	13	12
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	153	138
24 Printing and reproduction	2	10	9
25 Other services	26,906	39,971	30,742
26 Supplies and materials	445	230	208
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	48	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$29,600	$42,465	$33,000

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Advanced Research and Technology Development

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 986	$ 1,031	$ 1,165
11.3 Other than full-time permanent	7	...	...
11.5 Other personnel compensation	3	25	29
11.8 Special personal services payments	...	1	1
11.9 Total personnel compensation	996	1,057	1,195
12 Personnel benefits			
12.1 Civilian personnel	119	129	146
13 Benefits for former personnel	...	2	2
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	1	61	69
22 Transportation of things	1	8	9
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	92	103
24 Printing and reproduction	4	6	7
25 Other services	27,636	31,855	24,314
26 Supplies and materials	180	138	155
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	15	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	4,488	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$33,440	$33,348	$26,000

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Coal Liquefaction

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 2,384	$ 2,174	$ 1,587
11.3 Other than full-time permanent	14	...	...
11.5 Other personnel compensation	34	53	39
11.8 Special personal services payments	...	2	2
11.9 Total personnel compensation	2,432	2,229	1,628
12 Personnel benefits			
12.1 Civilian personnel	281	273	199
13 Benefits for former personnel	...	4	3
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	83	129	94
22 Transportation of things	2	16	12
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	193	141
24 Printing and reproduction	2	13	9
25 Other services	24,206	26,802	7,202
26 Supplies and materials	694	290	212
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	42	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	919	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$28,661	$29,949	$ 9,500

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Combustion Systems

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 774	$ 795	$ 981
11.3 Other than full-time permanent	14	...	...
11.5 Other personnel compensation	16	20	24
11.8 Special personal services payments	...	1	1
11.9 Total personnel compensation	804	816	1,006
12 Personnel benefits			
12.1 Civilian personnel	86	100	123
13 Benefits for former personnel	...	0	2
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	27	47	58
22 Transportation of things	...	6	7
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	71	87
24 Printing and reproduction	...	5	5
25 Other services	34,692	14,325	20,181
26 Supplies and materials	191	106	131
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	50	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$35,850	$15,476	$21,600

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Fuel Cells

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ ...	$ ...	$ ...
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	...	...
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	...	...	...
12 Personnel benefits			
12.1 Civilian personnel	...	...	...
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	...	...
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	1	...	...
25 Other services	27,103	35,225	5,200
26 Supplies and materials	...	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$27,104	$35,225	$ 5,200

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Heat Engines

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 190	$ 201	$ 294
11.3 Other than full-time permanent	1	...	...
11.5 Other personnel compensation	20	5	7
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	211	206	301
12 Personnel benefits			
12.1 Civilian personnel	20	25	37
13 Benefits for former personnel	...	...	1
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	12	17
22 Transportation of things	...	1	2
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	18	26
24 Printing and reproduction	...	1	2
25 Other services	17,467	11,958	7,875
26 Supplies and materials	8	27	39
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$17,706	$12,248	$ 8,300

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Underground Coal Gasification

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ ...	$ ...	$ ...
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	...	...
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	...	...	...
12 Personnel benefits			
12.1 Civilian personnel	...	...	...
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	...	...
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	5	...	...
25 Other services	4,017	2,426	...
26 Supplies and materials	...	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$ 4,022	$ 2,426	$ ...

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Magnetohydrodynamics

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ ...	$ ...	$ ...
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	...	...
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	...	...	...
12 Personnel benefits			
12.1 Civilian personnel	...	...	...
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	9	...	...
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	...	...	...
25 Other services	26,594	28,020	...
26 Supplies and materials	...	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$26,603	$28,020	$ ...

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Surface Coal Gasification

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 691	$ 570	$ 735
11.3 Other than full-time permanent	25	...	...
11.5 Other personnel compensation	32	14	18
11.8 Special personal services payments	...	1	1
11.9 Total personnel compensation	748	585	754
12 Personnel benefits			
12.1 Civilian personnel	82	72	92
13 Benefits for former personnel	...	1	1
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	53	34	44
22 Transportation of things	...	4	5
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	51	65
24 Printing and reproduction	...	3	4
25 Other services	37,576	32,449	4,737
26 Supplies and materials	141	76	98
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$38,600	$33,275	$ 5,800

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Petroleum

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 575	$ 604	$ 551
11.3 Other than full-time permanent	5	...	...
11.5 Other personnel compensation	...	15	13
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	580	619	564
12 Personnel benefits			
12.1 Civilian personnel	69	75	70
13 Benefits for former personnel	...	1	1
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	36	32
22 Transportation of things	...	5	4
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	54	49
24 Printing and reproduction	93	3	3
25 Other services	28,298	25,844	11,459
26 Supplies and materials	107	80	73
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	2	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$29,149	$26,717	$12,255

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Advanced Process Technology

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ ...	$ ...	$ 37
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	...	1
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	...	...	38
12 Personnel benefits			
12.1 Civilian personnel	...	...	5
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	...	2
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	3
24 Printing and reproduction	...	...	...
25 Other services	5,526	3,906	1,947
26 Supplies and materials	8	...	5
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$ 5,534	$ 3,906	$ 2,000

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Enhanced Oil Recovery

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 213	$ 235	$ 220
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	6	5
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	213	241	225
12 Personnel benefits			
12.1 Civilian personnel	28	29	28
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	14	13
22 Transportation of things	...	2	2
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	21	20
24 Printing and reproduction	93	1	1
25 Other services	10,952	11,254	8,982
26 Supplies and materials	57	31	29
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$11,343	$11,593	$ 9,300

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Oil Shale

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 363	$ 369	$ 294
11.3 Other than full-time permanent	5	...	...
11.5 Other personnel compensation	...	9	7
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	368	378	301
12 Personnel benefits			
12.1 Civilian personnel	40	46	37
13 Benefits for former personnel	...	1	1
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	22	17
22 Transportation of things	...	3	2
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	33	26
24 Printing and reproduction	...	2	2
25 Other services	11,820	10,684	530
26 Supplies and materials	42	49	39
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	2	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$12,272	$11,218	$ 955

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Unconventional Gas Recovery

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 317	$ 369	$ 294
11.3 Other than full-time permanent	7	...	...
11.5 Other personnel compensation	...	9	7
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	324	378	301
12 Personnel benefits			
12.1 Civilian personnel	39	46	37
13 Benefits for former personnel	...	1	1
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	22	17
22 Transportation of things	...	3	2
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	8	33	26
24 Printing and reproduction	...	2	2
25 Other services	8,126	8,422	1,175
26 Supplies and materials	80	49	39
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	6	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$ 8,583	$ 8,956	$ 1,600

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

FE Program Direction and Management Support

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$19,228	$22,691	$19,696
11.3 Other than full-time permanent	415	...	...
11.5 Other personnel compensation	507	536	470
11.8 Special personal services payments	27	15	12
11.9 Total personnel compensation	20,177	23,242	20,178
12 Personnel benefits			
12.1 Civilian personnel	2,527	2,848	2,471
13 Benefits for former personnel	71	44	39
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	1,447	1,348	1,170
22 Transportation of things	201	108	86
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	2,374	1,292	1,018
24 Printing and reproduction	54	84	66
25 Other services	20,683	32,278	12,063
26 Supplies and materials	1,830	2,030	1,574
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	188	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	492	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$50,044	$63,274	$38,665

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

HQ Program Direction

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 6,679	$ 7,307	$ 7,705
11.3 Other than full-time permanent	90	...	...
11.5 Other personnel compensation	97	179	189
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	6,866	7,486	7,894
12 Personnel benefits			
12.1 Civilian personnel	709	917	967
13 Benefits for former personnel	45	15	15
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	500	434	458
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	42	...	...
25 Other services	2,387	5,935	1,501
26 Supplies and materials	...	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	492	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$11,041	$14,787	$10,835

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

ETC Program Direction

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$12,270	$15,222	$11,813
11.3 Other than full-time permanent	309	...	...
11.5 Other personnel compensation	409	357	281
11.8 Special personal services payments	22	15	12
11.9 Total personnel compensation	13,010	15,594	12,106
12 Personnel benefits			
12.1 Civilian personnel	1,780	1,911	1,482
13 Benefits for former personnel	5	29	24
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	940	904	701
22 Transportation of things	201	108	85
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	2,374	1,292	1,018
24 Printing and reproduction	11	84	66
25 Other services	18,332	26,170	10,544
26 Supplies and materials	1,829	2,030	1,574
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	188	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$38,670	$48,122	$27,600

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Alaska Natural Gas Transportation System

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ 280	$ 162	$ 178
11.3 Other than full-time permanent	17	...	...
11.5 Other personnel compensation	1	...	...
11.8 Special personal services payments	5	...	...
11.9 Total personnel compensation	303	162	178
12 Personnel benefits			
12.1 Civilian personnel	38	20	22
13 Benefits for former personnel	20	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	7	10	11
22 Transportation of things	...	...	1
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	1	...	...
25 Other services	-37	173	18
26 Supplies and materials	1	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	...	...	...
32 Land and structures	...	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$ 333	$ 365	$ 230

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

FOSSIL ENERGY CONSTRUCTION
(89X0214)

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ ...	$ ...	$ ...
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	...	...
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	...	...	...
12 Personnel benefits			
12.1 Civilian personnel	...	...	...
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	...	...
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	...	...	...
25 Other services	...	...	...
26 Supplies and materials	...	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	1,016	...	...
32 Land and structures	1,147	133	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$ 2,163	$ 133	$ ...

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Plant & Capital Equipment

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ ...	$ ...	$ ...
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	...	...
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	...	...	...
12 Personnel benefits			
12.1 Civilian personnel	...	...	...
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	...	...
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	...	...	...
25 Other services	-1	...	...
26 Supplies and materials	...	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	5,037	2,088	480
32 Land and structures	4,029	2,066	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$ 9,066	$ 4,154	$ 480

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Construction
(Operating Funded)

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ ...	$ ...	$ ...
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	...	...
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	...	...	...
12 Personnel benefits			
12.1 Civilian personnel	...	...	...
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	...	...
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	...	...	...
25 Other services	...	...	...
26 Supplies and materials	...	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	4	...	...
32 Land and structures	3,779	2,066	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$ 3,783	$ 2,066	$ ...

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(dollars in thousands)

OBJECT CLASS

Capital Equipment

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
10 PERSONNEL SERVICES AND BENEFITS			
11 Personnel compensation			
11.1 Full-time permanent	$ ...	$ ...	$ ...
11.3 Other than full-time permanent	...	...	...
11.5 Other personnel compensation	...	...	...
11.8 Special personal services payments	...	...	...
11.9 Total personnel compensation	...	...	...
12 Personnel benefits			
12.1 Civilian personnel	...	...	...
13 Benefits for former personnel	...	...	...
20 CONTRACTUAL SERVICES AND SUPPLIES			
21 Travel and transportation of persons	...	...	...
22 Transportation of things	...	...	...
23 Rent, communications, and utilities			
23.2 Communications, utilities and other rent	...	...	...
24 Printing and reproduction	...	...	...
25 Other services	-1	...	...
26 Supplies and materials	...	...	...
30 ACQUISITION OF CAPITAL ASSETS			
31 Equipment	5,033	2,088	480
32 Land and structures	250	...	...
40 GRANTS AND FIXED CHARGES			
41 Grants, subsidies and contributions	...	...	...
43 Interest and dividends	...	...	...
99.9 Total obligations	$ 5,283	$ 2,088	$ 480

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT

STAFFING SUMMARY
Distribution of FTE's
FOSSIL ENERGY RESEARCH AND DEVELOPMENT

	Full-Time Equivalents		
	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Control Technology & Coal Prep.	62	52	43
AR&TD	36	31	32
Coal Liquefaction	77	66	44
Combustion Systems	29	24	27
Fuel Cells	...	...	...
Heat Engines	6	6	8
Underground Coal Gasification	...	...	...
Magnetohydrodynamics	...	...	...
Surface Coal Gasification	19	17	20
Advanced Process Technology	...	...	1
Enhanced Oil Recovery	7	7	6
Oil Shale	11	11	8
Unconventional Gas Recovery	11	11	8
Program Direction	443	475	370
Alaska Natural Gas Transportation System	5	3	3
Total:	706	703	570

Attrition Rate: FY 1984: 7.3% FY 1985: 5.9% FY 1986: 5.6%

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT

STAFFING SUMMARY
Distribution of FTE's
FOSSIL ENERGY RESEARCH AND DEVELOPMENT HEADQUARTERS

	Full-Time Equivalents		
	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Control Technology & Coal Prep.	...	...	...
AR&TD	...	...	...
Coal Liquefaction	...	...	...
Combustion Systems	...	...	...
Fuel Cells	...	...	...
Heat Engines	...	...	...
Underground Coal Gasification	...	...	...
Magnetohydrodynamics	...	...	...
Surface Coal Gasification	...	...	...
Advanced Process Technology	...	...	...
Enhanced Oil Recovery	...	...	...
Oil Shale	...	...	...
Unconventional Gas Recovery	...	...	...
Program Direction	136	135	130
Alaska Natural Gas Transportation System	5	3	3
Total:	141	138	133

Attrition Rate: FY 1984: 10.9% FY 1985: 3.75% FY 1986: 5.7%

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT

STAFFING SUMMARY
Distribution of FTE's
BARTLESVILLE PROJECT OFFICE

	Full-Time Equivalents		
	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Control Technology & Coal Prep.	...	...	...
AR&TD	...	...	...
Coal Liquefaction	...	...	...
Combustion Systems	...	...	...
Fuel Cells	...	...	...
Heat Engines	...	...	...
Underground Coal Gasification	...	...	...
Magnetohydrodynamics	...	...	...
Surface Coal Gasification	...	...	...
Advanced Process Technology	...	...	...
Enhanced Oil Recovery	...	...	...
Oil Shale	...	...	...
Unconventional Gas Recovery	...	...	...
Program Direction	14	15	7
Total:	14	15	7
Attrition Rate:	FY 1984: 7%	FY 1985: 7%	FY 1986: 1%

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT

STAFFING SUMMARY
Distribution of FTE's
MORGANTOWN ENERGY TECHNOLOGY CENTER

	Full-Time Equivalents		
	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Control Technology & Coal Prep.	17	17	13
AR&TD	16	16	17
Coal Liquefaction	...	...	...
Combustion Systems	7	7	11
Fuel Cells	...	...	...
Heat Engines	6	6	8
Underground Coal Gasification	...	...	...
Magnetohydrodynamics	...	...	...
Surface Coal Gasification	17	17	20
Advanced Process Technology	...	...	1
Enhanced Oil Recovery	7	7	6
Oil Shale	11	11	8
Unconventional Gas Recovery	11	11	8
Program Direction	176	178	118
Total:	268	270	210

Attrition Rate: FY 1984: * FY 1985: 8.73% FY 1986: 8.9%

* In FY 1984, METC hired 36 FTP's and lost 31 (attrition rate of 1.27 versus gain rate of 1.47).

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
FOSSIL ENERGY RESEARCH AND DEVELOPMENT

STAFFING SUMMARY
Distribution of FTE's
PITTSBURGH ENERGY TECHNOLOGY CENTER

	Full-Time Equivalents		
	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Control Technology & Coal Prep.	45	35	30
AR&TD	20	15	15
Coal Liquefaction	77	66	44
Combustion Systems	22	17	16
Fuel Cells	...	...	...
Heat Engines	...	...	...
Underground Coal Gasification	...	...	...
Magnetohydrodynamics	...	...	...
Surface Coal Gasification	2	...	...
Advanced Process Technology	...	...	...
Enhanced Oil Recovery	...	...	...
Oil Shale	...	...	...
Unconventional Gas Recovery	...	...	...
Program Direction	117	147	115
Total:	283	280	220

Attrition Rate: FY 1984: 4% FY 1985: 4% FY 1986: 6.9%

U.S. DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST

MORGANTOWN ENERGY TECHNOLOGY CENTER
(dollars in thousands)

SUMMARY OF ACTIVITIES

PROGRAM	FY 1986[1]		FY 1987[1]		FY 1988	
	B/A	FTE	B/A	FTE	B/A	FTE
Control Technology and Coal Preparation	7,821	17	15,600	17	9,530	13
Advanced Research and Technology Development	5,889	16	6,257	16	5,459	17
Coal Liquefaction	1,031	0	363	0	55	0
Combustion Systems	21,721	7	8,480	7	7,710	11
Fuel Cells	28,623	0	26,131	0	4,997	0
Heat Engines	12,289	6	11,842	6	8,095	8
Underground Coal Gasification	2,605	0	1,590	0	0	0
Surface Coal Gasification	35,698	17	22,045	17	4,850	20
Total Coal	115,677	63	92,308	63	40,696	69

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[1] The funding in this exhibit is intended to cover current R&D operations at the Center, costs associated with the operation of project offices at Grand Forks, North Dakota, and Laramie, Wyoming including efforts under the cooperative agreements with the University of North Dakota Energy Research Center, and the University of Wyoming Research Institute. Also included is contracted work managed by the Center and project offices. The above funding does not include amounts provided to the National Laboratories by the Center. For FY 1986 and FY 1987 funding, prior year unobligated amounts are not included. These amounts represent past year and current year budget authority and include reductions associated with the Gramm-Rudman-Hollings Act of FY 1986.

MORGANTOWN ENERGY TECHNOLOGY CENTER

SUMMARY OF ACTIVITIES Con't.

PROGRAM	FY 1986[1/]		FY 1987[1/]		FY 1988	
	B/A	FTE	B/A	FTE	B/A	FTE
Advanced Process Technology	998	0	679	0	417	1
Enhanced Oil Recovery	2,437	7	2,414	7	600	6
Oil Shale	6,711	11	7,665	11	955	8
Total Petroleum	10,146	18	10,758	18	1,972	15
Unconventional Gas Recovery	3,475	11	3,604	11	1,600	8
Total Gas	3,475	11	3,604	11	1,600	8
Program Direction	20,164	176	23,571	178[1/]	13,812	118
Total Capital Equipment	771	0	750	0	0	0
Total Construction	1,856	0	875	0	0	0
Total Fossil Energy R&D	152,089	268	131,866	270	58,080	210
Clean Coal Technology	165	0	54,700	0	139,400	9
Total Morgantown Energy Technology Center	152,254	268	186,566	270	197,480	219

[1/] Five of the 178 FTE's are for Clean Coal Technology.

U.S. DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST

MORGANTOWN ENERGY TECHNOLOGY CENTER

SUMMARY OF ACTIVITIES
NARRATIVE

The Morgantown Energy Technology Center (METC) performs the day-to-day project management and in-house R&D functions for assigned programmatic areas which include Gas Stream Cleanup, Fluidized-Bed Combustion, Fuel Cells, Heat Engines, Surface Coal Gasification, Unconventional Gas Recovery, Arctic and Offshore technologies, Instrumentation and Control, and Component Development for Coal Conversion and Utilization Processes. These activities include the technology development for slurried fixed bed gasifiers, and fluidized-bed combustion as well as characterization, resource inventory, and field tests of unconventional natural gas reservoirs.

In Control Technology, METC's activities include the development of technologies for Gas Stream Cleanup, and for Waste Management and Utilization. The primary objective of the Gas Stream Cleanup Project is to develop the required technology base for applications of post combustion/utilization devices used as advanced power conversion systems such as fuel cell and gas turbine combined cycles, and where applicable, in other conversion processes where significant process improvement results. The purpose of program activities in the Fluidized-Bed Combustion area is to increase the utilization of coal by developing advanced AFB concepts and technologies for the Pressurized Fluidized-Bed (PFB) process. The PFB program is designed to provide the technology base necessary to develop steam combined cycle concepts. In the Heat Engines program, METC is conducting and managing contracted research and technology development directed toward the solution of major engineering design, durability and performance problems. In the Surface Coal Gasification program, METC is managing in-house and contract research and development involving advances in the state-of-the-art of coal gasification through new concepts development, and development of technologies for the refinement of existing gasification systems. METC's mission in Unconventional Gas Recovery involves the development of technologies for the recovery of gas from unconventional sources such as eastern Devonian oil shales, western gas sands, methane from coalbeds, methane hydrates and deep subducted gas, and arctic and offshore research technologies. An overall data base to support technology development for all noted technologies is being developed.

In addition to in-house R&D functions, METC personnel manage industrial and university contracts and National Laboratory R&D activities. Typical work activities performed include contract and National Laboratory monitoring, performance of technical evaluations, R&D in support of programmatic activities, development of project and procurement plans, dissemination of technical data, and other activities related to program and site support. In FY 1987, the primary focus of METC activities will be the conduct of in-house research and maintenance of the technology data base for assigned program areas. Contract monitoring activities related to University and National Laboratory research will also continue.

SUMMARY OF ACTIVITIES - NARRATIVE Con't.

During FY 1986, the ETC's also participated in the initiation of the Clean Coal Technology Program. The overall goal of the Clean Coal Technology Program is to conduct cost-shared construction and operation of clean coal technology projects to demonstrate the feasibility of future commercial applications of these technologies. When complete, it is expected that these demonstration projects will provide sufficient technical, economic, environmental, health and safety, and operational information at a large enough scale to enable the private sector to make rational commercialization decisions. In accordance with the earlier guidance and P.L. 99-190 making funds available, the Clean Coal Technology Program solicitation was issued on February 18, 1986, with a closing date of April 18, 1986. The proposals were evaluated and nine projects selected for negotiations on July 24, 1986. The prenegotiation and negotiation activities are currently being conducted at the ETC's.

U.S. DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST

PITTSBURGH ENERGY TECHNOLOGY CENTER
(dollars in thousands)

SUMMARY OF ACTIVITIES

PROGRAM	FY 1986[1/]		FY 1987[1/]		FY 1988	
	B/A	FTE	B/A	FTE	B/A	FTE
Control Technology and Coal Preparation	19,898	45	19,080	35	21,221	30
Advanced Research and Technology Development	11,170	20	9,857	15	7,796	15
Coal Liquefaction	26,754	77	19,511	66	7,535	44
Combustion Systems	6,586	22	5,466	17	5,824	16
Fuel Cells	0	0	0	0	0	0
Underground Coal Gasification	0	0	0	0	0	0
Magnetohydrodynamics	7,687	0	6,856	0	0	0
Surface Coal Gasification	143	2	0	0	0	0
Total Coal	72,238	166	60,770	133	42,376	105
Advanced Process Technology	0	0	0	0	0	0
Enhanced Oil Recovery	0	0	0	0	0	0
Oil Shale	0	0	0	0	0	0
Total Petroleum	0	0	0	0	0	0

[1/] Funding in this exhibit is intended to cover current R&D operations at the Center and contracted work managed by the Center. The above funding does not include amounts provided to the National Laboratories by the Center. For FY 1986 and FY 1987 funding, prior year unobligated amounts are not included. These amounts represent past year and current year budget authority and include reductions associated with the Gramm-Rudman-Hollings Act of FY 1986.

PITTSBURGH ENERGY TECHNOLOGY CENTER

SUMMARY OF ACTIVITIES Con't.

PROGRAM	FY 1986[1]		FY 1987[1]		FY 1988	
	B/A	FTE	B/A	FTE	B/A	FTE
Unconventional Gas Recovery	0	0	0	0	0	0
Total Gas	0	0	0	0	0	0
Program Direction	17,679	117	21,739	147[1]	12,699	115
Total Capital Equipment	1,201	0	750	0	480	0
Total Construction	1,378	0	875	0	0	0
Total Fossil Energy R&D	92,496	283	84,134	280	55,555	220
Clean Coal Technology	111	0	6,013	0	11,900	6
Total Pittsburgh Energy Technology Center	92,607	283	90,147	280	67,455	226

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[1] Six of the 147 FTE's are for Clean Coal Technology.

U.S. DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST

PITTSBURGH ENERGY TECHNOLOGY CENTER

SUMMARY OF ACTIVITIES
NARRATIVE

The Pittsburgh Energy Technology Center (PETC) performs the day-to-day project management and in-house R&D functions in the program areas of Direct Utilization, Coal Liquefaction, Coal Preparation, Alternative Fuels, Advanced Combustion Technology, Flue Gas Cleanup, and Magnetohydrodynamics (MHD). This includes numerous research and development activities associated with the development, in an environmentally acceptable manner, of industrial uses of coal and its derived synthetic fuels.

The PETC program objectives in the area of Advanced Research and Technology Development are: to establish the technology base and develop the advanced fossil fuel combustion systems to accelerate the direct utilization of coal in industry and commercial power generation. The technology areas specifically include pulverized coal combustion, synthetic fuel utilization, heat exchanger technology, and advanced control systems.

The goal of the Coal Liquefaction program is to establish a data base that will facilitate the private sector's development of coal conversion processes for economical production of environmentally acceptable synthetic liquid fuels through generic R&D in high-risk, long-term concepts that have potential for high payoff. The overall strategy is to support a number of liquefaction concepts in parallel at the laboratory scale. Specific areas of concentration include: 1) the development of new and improved indirect liquefaction technology; 2) the development of more advanced direct coal liquefaction processes for further private sector development and demonstration; and, 3) the generation of supporting data in the areas of environment and health effects; key instrumentation and components, engineering analyses and data base management.

The effort in the University Coal Research program is aimed at establishing research grants at colleges and universities for basic and applied research to improve scientific and technical understanding of the fundamental processes involved in the conversion and utilization of coal, to furnish technical support for ongoing and developing coal conversion processes, and to develop new approaches for the design of future coal conversion and utilization technologies.

The Coal Preparation program focuses on the development of advanced coal cleaning technologies required by private industry to meet the anticipated growth in the demand for higher quality coal. The principal thrust of the program is directed towards: 1) new and advanced technologies to liberate finely dispersed pyritic sulfur and ash particles; 2) advanced, unconventional methods to extract organic sulfur from coal; and, 3) advanced technologies to beneficiate low rank coals and lignite. The existing program encompasses laboratory bench scale research to physically liberate and separate finely disseminated pyrite and mineral impurities in selected, economically important, U.S. coals. Parallel efforts under Alternative Fuel Mixtures within the Combustion Systems activity are directed towards the preparation and utilization of highly cleaned coal water slurries as retrofit fuels for oil and gas designed units. Two chemical concepts are being evaluated at the bench scale level which give promise of cleaning coals to a quality level comparable to fuel oil.

The Flue Gas Cleanup program focuses on the development of a technology base for simple, cost effective and environmentally superior processes that remove pollutants from coal combustion gas streams in both utility and industrial boilers in light of existing, as well as anticipated, more stringent environmental standards.

In addition, PETC provides oversight over the Cooperative Agreement with the National Institute of Petroleum and Energy Reserves, which performs research in Enhanced Oil Recovery and Advanced Process Technology.

PETC's personnel perform in-house R&D functions and manage industrial and university contracts and National Laboratory R&D efforts. Typical work activities include contract and National Laboratory monitoring, performance of technical evaluations, development of project and procurement plans, dissemination of technical data, and other activities related to program and site support. In FY 1987, the primary focus of PETC activities will be the conduct of in-house research and maintenance of the technology data base for assigned program areas. Contract monitoring activities related to University and National Laboratory research will also continue, as well as the Cooperative Agreement with the National Institute of Petroleum and Energy Reserves.

During FY 1986, the ETC's also participated in the initiation of the Clean Coal Technology Program. The overall goal of the Clean Coal Technology Program is to conduct cost-shared construction and operation of clean coal technology projects to demonstrate the feasibility of future commercial applications of these technologies. When complete, it is expected that these demonstration projects will provide sufficient technical, economic, environmental, health and safety, and operational information at a large enough scale to enable the private sector to make rational commercialization decisions. In accordance with the earlier guidance and P.L. 99-190 making funds available, the Clean Coal Technology Program solicitation was issued on February 18, 1986, with a closing date of April 18, 1986. The proposals were evaluated and nine projects selected for negotiations on July 24, 1986. The prenegotiation and negotiation activities are currently being conducted at the ETC's.

U.S. DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST

BARTLESVILLE PROJECT OFFICE
(dollars in thousands)

SUMMARY OF ACTIVITIES

PROGRAM	FY 1986 1/		FY 1987 1/		FY 1988	
	B/A	FTE	B/A	FTE	B/A	FTE
Control Technology and Coal Preparation	0		0		0	
Advanced Research and Technology Development	0		37		0	
Coal Liquefaction	502		655		415	
Combustion Systems	0		0		0	
Fuel Cells	0		111		0	
Heat Engines	0		0		0	
Total Coal	502		803		415	
Advanced Process Technology	3,210		2,138		1,350	
Enhanced Oil Recovery	6,212		6,320		8,350	
Oil Shale	0		0		0	
Total Petroleum	9,422		8,458		9,700	
Unconventional Gas Recovery	0		0		0	
Total Gas	0		0		0	

1/ The funding in this exhibit is intended to cover operation of the project office and contracted work managed by the project office. The above funding does not include amounts provided to the National Laboratories by the project office. For FY 1986 and FY 1987 funding, carryover is not included. These amounts represent past year and current year budget authority and include reductions associated with the Gramm-Rudman-Hollings Act of FY 1986.

BARTLESVILLE PROJECT OFFICE

SUMMARY OF ACTIVITIES Con't.

PROGRAM	FY 1986[1/]		FY 1987[1/]		FY 1988	
	B/A	FTE	B/A	FTE	B/A	FTE
Program Direction	1,671	14	1,642	15	1,089	7
Total Capital Equipment	348		0		0	
Total Construction	98		0		0	
Total Bartlesville Project Office	12,041	14	10,903	15	11,204	7

U.S. DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST

BARTLESVILLE PROJECT OFFICE

SUMMARY OF ACTIVITIES
NARRATIVE

The Bartlesville Project Office (BPO), with program guidance from Headquarters, has the lead responsibility for two programs: Enhanced Oil Recovery (EOR) and Advanced Exploratory Research (AER). Together, these two programs comprise a major portion of the Department's petroleum research effort. BPO has the prime responsibility for formulating and executing implementation plans for these efforts which are critical to the nation's long-term energy position. In carrying out the research, BPO staff monitors, coordinates and evaluates research efforts at other Energy Technology Centers, National Laboratories, Universities, and a variety of private contractors.

The largest single contract effort is with the National Institute for Petroleum and Energy Research (NIPER), which was created at the start of FY 1984 with the defederalization of Bartlesville Energy Technology Center, the decentralized center from which BPO and NIPER evolved. NIPER is operated under a cooperative agreement between the DOE and the IIT Research Institute (IITRI). Under the terms of the agreement, DOE will fully fund a base program of research in petroleum science at a level of $5 million per year for five years. In addition, DOE and IITRI will cost share an optional program of equal size, with DOE contributing funds on a decreasing basis, over the five year span of the agreement. In aggregate, DOE could fund up to $10M over the five year period and IITRI up to $15M. Since this is a cooperative agreement, BPO staff participates in the development of all NIPER projects under both programs, through committees established under the cooperative agreement. These committees provide technical and management guidance resulting in the establishment of an independent research operation in the private sector, supporting the EOR and AER activities. IITRI is raising its share of the funds through marketing industrial and other agency participation in the program. This gives BPO an ideal opportunity to interact with industry and to obtain information critical to the formulation of our own research programs. NIPER also has the opportunity to use the Bartlesville facility to conduct research for private customers independent of the federal program. It is anticipated the NIPER will have achieved financial independence by the end of the five-year agreement. Monitoring and guiding NIPER in its research is a major activity of the BPO.

The BPO also has the major responsibility of providing support to other DOE and Government offices in the area of petroleum technology. This expertise is not widely available in Government and frequent requests are received for support. Currently, the BPO is providing such support to: Strategic Petroleum Reserve, by managing a program of oil analysis to determine composition and mixing effects; Office of Energy Research/Basic Energy Sciences, by managing a basic research effort to determine fundamental thermodynamic properties; Navy Department, in managing research efforts on reclaiming contaminated diesel fuel, and a number of other fuel related projects; Department of Defense (DOD), by managing two projects in the fuels area; Environmental Protection Agency (EPA), by investigating the effects of lead phasedown on older engines and disposal of industrial wastes in deep injection wells; Federal Aviation Agency, by managing a project to investigate the effects of weathering on octane number; and the Justice Department, by providing expert testimony in an investigation.

The BPO also maintains and operates the Tertiary Oil Recovery Information System (TORIS). This system comprises the most extensive and accurate source of state-of-the-art information available on Enhanced Oil Recovery. It was initiated by BETC in 1980, and was adopted, greatly expanded, and improved by the National Petroleum Council (NPC) during their recent study (1982-1984) of EOR potential. The NPC has estimated that the industry participants combined effort in upgrading the TORIS was around 70 man-years. This major system is maintained on the BPO computer and is available to support a variety of users. The system is currently used to: update and maintain the EOR Program Plan, determine research priorities for the FE program; assess the current state of the art in field work through collecting and analyzing the annual reports filed under the DOE Tertiary Incentive Program; and developing answers to inquiries from public bodies such as individual states and the Interstate Oil Compact Commission. An example of this is the current evaluation of state potential incentives to promote EOR activities within their borders. BPO is providing data and model runs to the IOCC. On an international basis, the TORIS system is widely reviewed and used as a model for similar projects.

The BPO also has a major responsibility for cooperative research under International Agreements with Venezuela and Mexico and discussions are in progress concerning similar cooperative research agreements with Italy, England, Norway, and China.

NAVAL PETROLEUM AND OIL SHALE RESERVES

For necessary expenses in carrying out naval petroleum and oil shale reserves activities, [including the purchase of not to exceed 1 passenger motor vehicle, for replacement only, $122,177,000,] $159,700,000 to remain available until expended. (Department of the Interior and Related Agencies Appropriations Act, 1987, as included in Public Laws 99-500 and 99-591, section 101(h).)

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

AMOUNTS AVAILABLE FOR OBLIGATION

NAVAL PETROLEUM AND OIL SHALE RESERVES

	FY 1987	FY 1988
Appropriation	$122,177	$159,700
Unobligated Balances, Start of Year	58,067	18,000
Unobligated Balances, End of Year	-18,000	---
Total, Obligations	$ 162,244	$177,700

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

NAVAL PETROLEUM AND OIL SHALE RESERVE

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Request
Naval Petroleum and Oil Shale Reserve	$ 168,850	$ 158,638	$ 177,700
Use of Prior Year Balances	-155,848	-36,461	-18,000
Total, Naval Petroleum and Oil Shale Reserve	$ 13,002	$ 122,177	$ 159,700
Revenues	$-578,324	$-608,339	$ -699,906

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES

OVERVIEW

NAVAL PETROLEUM AND OIL SHALE RESERVES

Pursuant to the Naval Petroleum Reserves Production Act of 1976, the Naval Petroleum Reserves (NPR) are produced at their maximum efficient rates (MER), and the petroleum may be sold competitively in the open market, or transferred to the Department of Defense or the Strategic Petroleum Reserve.

The budget proposes that the Federal government sell NPR-1 and 3. The Administration believes that running these oil fields is an important activity, but one that belongs outside the Federal government. Selling these Reserves is consistent with the Administration's policy of eliminating non-essential government activities, trimming the size of government, and turning over to the private sector activities that the private sector is well-equipped to undertake. Private owners are likely to produce and market oil and gas from these Reserves somewhat more effectively and efficiently than the government.

The budget assumes that NPR-1 and 3 will be sold at the end of FY 1988, if Congress enacts legislation authorizing the sale. A sales price of $3.3 billion is assumed in the President's budget, with $2.5 billion received in FY 1988 and $0.8 billion in FY 1989. The actual sales price will, of course, be determined by market forces when the Reserves are sold. Pending completion of the sale, the budget includes funding for the continued operation of NPR-1 and 3 through FY 1988. If the sale occurs before the end of FY 1988, amounts appropriated but not needed would be proposed for rescission.

This budget requests a total of $177.7 million, an increase of approximately $14.0 million over FY 1987. Primary development programs at both Reserves have been completed, and the thrust of the FY 1987 program is directed at operating and maintaining the Reserves. It is anticipated that enhanced oil recovery techniques will be implemented in the future and additional development funding (drilling and facilities) will be requested, if the oil fields have not been sold, at that time.

Production of oil will continue to be maintained at the maximum efficient production rates of the reservoirs. The drilling activities will be carried out in response to the requirements of the individual reservoirs to maintain MER. In addition, the potential for infill drilling and implementation of various enhanced oil recovery techniques will be analyzed during FY 1987. Initiation of a waterflood expansion program at NPR-1 and an enhanced oil recovery project at NPR-3 is projected to begin in FY 1988.

Total receipts from the sale of petroleum and related products from the Reserves in FY 1986 were $763 million, a decline from the $1.3 billion received in FY 1985. This decline resulted from the sharp drop in world wide oil prices beginning about November 1985. Prices are currently projected to be below the FY 1985 level through FY 1987 and FY 1988. Revenues are estimated to be $608 million for FY 1987 and $700 million for FY 1988. These revenues assume a stabilization of current California prices in FY 1987 at approximately $13.50 per barrel and a rise in FY 1988 to over $15 per barrel.

Receipts from sales are transferred to the U.S. Treasury and deposited in either the Miscellaneous Receipts or the Windfall Profits Tax accounts. Windfall Profits Taxes in FY 1986 were $39 million, but none are estimated for FY 1987 and FY 1988 due to low oil prices. Chevron U.S.A, Inc., which owns approximately 22% of the Elk Hills, California oil field, reimburses the government for its share of unit operations at NPR-1. These reimbursements also are deposited in the Miscellaneous Receipts account. NPR-2 lease royalties and pipeline usage fees account for additional revenues of approximately $3 million per year.

In May 1986, the Secretary of Energy ordered the immediate cutback of approximately 20,000 barrels of oil per day (BOPD) at the Naval Petroleum and Oil Shale Reserves in California, to reflect conservative maximum efficient production rates, pending a formal determination of individual reservoir MERs. These determinations have been completed, and will be reviewed and updated every six months on an individual reservoir basis.

Under a new sales procedure which indexes the price of NPR crude oil to California spot market prices, it is now planned that all NPR crude oil will be sold on the open market to the highest competitive bidder.

NPR-1, Elk Hills, located near Bakersfield, California, is operated under a unitization agreement (Unit Plan Contract) between the Government and Standard Oil Company of California (Chevron U.S.A. Inc). Under this agreement, the Government establishes the rate of production, but all exploration, prospecting, development and producing operations on the Reserve are conducted on under the supervision and direction of a two-member Operating Committee consisting of one Government Member and one Chevron Member. The Unit Operator is Bechtel Petroleum Operations, Inc., which is under a 5-year cost-plus-award-fee contract with the Government which began August 1, 1985. Total production at NPR-1 in FY 1986 averaged 115,525 BOPD, 349 MMCF/D of natural gas and 633 MGAL/D of liquid gas products. Production is expected to average approximately 111,000 BOPD in FY 1987 (Government share 85,000 BOPD), 350 MMCF/D of natural gas and 690 MGAL/D of liquid gas products. In FY 1988, production is estimated at 106,000 BOPD (Government share 83,000 BOPD), 380 MMCF/D of natural gas and 750 MGAL/D of liquid gas products. The Government share of production varies by geologic zone, averaging approximately 78 percent of total production.

The current development and exploration programs were initiated at NPR-1 in FY 1975. Since that time, 1001 development wells and 39 exploration wells have been drilled, including 23 development wells in FY 1986. An additional 35 development wells are scheduled for FY 1987, and 38 development wells are planned for FY 1988. The deep test exploratory well reached a depth of almost 16,000 feet in FY 1986 and will be completed in FY 1987. While no exploratory wells are scheduled for FY 1988, exploration could continue in the future as promising drilling sites are identified.

The Development Facilities category is an ongoing element of the NPR-1 program, meeting construction and modification requirements in response to changing field conditions. As the field matures, changes in reservoir pressures and increasing amounts of the gas and water are being encountered. The facilities requested are needed to maintain the field's maximum efficient rate of production, enhance ultimate recovery and ensure compliance with environmental and safety regulations. In the event the Department does not sell the Reserve by the end of FY 1988, major facilities expansion, primarily in the areas of waterflood and steamflood activities, is envisioned in the future.

NPR-3, Teapot Dome, located near Casper, Wyoming, produced an average of 3,151 BOPD, 8MMCF/D of natural gas, and 13 MGAL/D of liquid gas products in FY 1986. As the result of a highly successful drilling program, production is estimated to average 3,100 BOPD in FY 1987 and FY 1988. Natural gas and liquid gas products will remain level in FY 1987 and FY 1988 at 10 MMCF/D of natural gas and 13 MGAL/D of liquid gas products. Substantial costs saving measures have been and will continue to be implemented at NPR-3 in order to maintain net positive cash flow to the Government.

A program to fully develop NPR-3 was initiated simultaneously with open-up in FY 1976. The drilling program has resulted in 608 development wells drilled since that time. Fifty-two development and infill wells are scheduled for FY 1987 with 29 wells planned in FY 1988. In an effort to increase production from areas of the Shannon Reservoir which are not amenable to EOR, an infill drilling program was initiated, consisting of 30 wells in FY 1987. Additional Shannon infill wells may be drilled, depending on oil prices, production levels, and funding availability in the second half of FY 1987. As many as 150 low cost infill wells could be drilled in future years, if shown to be economic. Additionally, the potential for application of enhanced recovery techniques in the Shannon Reservoir is being investigated through pilot projects. These pilot projects are being evaluated for economic and technical success. Should any of these recovery methods along with the infill drilling prove successful, a design plan for further expansion into the Shannon Reservoir will be developed in FY 1987 for implementation in FY 1988. The contractor operator at NPR-3 is Lawrence-Allison and Associates West, Inc., which began its second 5-year cost-plue-award-fee contract October 1, 1986.

To protect the natural gas resources at NOSR-3 from potential drainage by commercial development adjacent to the Reserve, offset drilling was begun in FY 1985. A 14 well drilling program in the Rulison Field, originally established to protect against drainage of existing reserves to adjacent producing gas wells, was postponed in FY 1986 due to the low marketability of natural gas. Should the price of gas rebound and neighboring wells resume production, the drilling program will be reinitiated. Surface resource management activities will be continued at all the NOSRs, and are conducted out under an interagency agreement with the Bureau of Land Management. These funds also provide for annual operation and maintenance fees for rights to water stored in the Bureau of Reclamation's Ruedi Reservoir. An environmental monitoring program of the spent shale pile at NOSR-3 is being initiated in FY 1987 and will be continued in FY 1988.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

LEAD TABLE

NAVAL PETROLEUM AND OIL SHALE RESERVES

	FY 1986 ACTUAL	FY 1987 APPROPRIATION	FY 1988 BASE	FY 1988 REQUEST	REQUEST vs. BASE
Reserves Nos. 1 & 2					
Operations & Maintenance.....	$ 94,843	$ 95,640	$ 95,640	$ 111,071	$+15,431
Development Drilling.........	17,900	22,900	22,900	18,704	-4,196
Exploration Drilling.........	9,900	3,800	3,800	---	-3,800
Development Facilities.......	8,000	8,000	8,000	20,480	+12,480
Subtotal.................	$130,643	$130,340	$130,340	$ 150,255	$ 19,915
Reserve No. 3					
Operations & Maintenance.....	$ 20,086	$ 15,610	$ 15,610	$ 13,166	$ -2,444
Development Drilling.........	3,950	6,754	6,754	4,176	-2,578
Development Facilities.......	5,047	250	250	4,398	+4,148
Subtotal.................	$ 29,083	$ 22,614	$ 22,614	$ 21,740	$ - 874
Naval Oil Shale Reserves					
NOSR-1.......................	$ 104	$ 60	$ 60	$ 80	$ + 20
NOSR-3.......................	3,593	250	250	130	- 120
Subtotal.................	$ 3,697	$ 310	$ 310	$ 210	$ - 100
Program Direction					
Headquarters.................	$ 1,448	$ 1,664	$ 1,664	$ 1,700	$ + 36
Reserve No. 3 & NOSRs........	735	835	835	795	- 40
Reserve Nos. 1 & 2...........	3,244	2,875	2,875	3,000	+ 125
Subtotal.................	$ 5,427	$ 5,374	$ 5,374	$ 5,495	$ + 121
Subtotal.....................	$168,650	$158,638	$158,638	$177,700	$+19,062
Use of Prior Year Balance.....	-155,848	- 36,461	- 36,461	-18,000	$+18,461
Total.........................	$ 13,002	$122,177	$122,177	$159,700	$+37,523
Staffing (FTEs)...............	99	95	95	95	0

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

SUMMARY OF CHANGES

NAVAL PETROLEUM AND OIL SHALE RESERVES

FY 1987 Appropriation Enacted	$ 122,177
FY 1988 Base	122,177
Reserves Nos. 1 & 2	
- Operations & Maintenance Increase due to maintenance and repair requirements, number and type of remedial jobs, environmental requirements, contractor operating costs, outside gas processing, electricity, and inflation.	+ 15,431
- Development Drilling Decrease due to greater number of shallow wells scheduled for drilling.	- 4,196
- Exploration Drilling No exploration wells planned for FY 1988.	- 3,800
- Development Facilities Increase due to surface facility requirements and Stevens waterflood expansion.	+12,480
Reserve No. 3	
- Operations & Maintenance Decrease due to reduction in maintenance and well stimulation work, reduced enhanced oil recovery pilot project activity, and reduced contractor staffing.	- 2,444
- Development Drilling Decrease due to number of wells scheduled for drilling.	- 2,578
- Development Facilities Increase due to initiation of Shannon Reservoir enhanced production project.	+ 4,148

Naval Oil Shale Reserves		
- NOSRs 1 and 2 Increase due to requirements for land management.	+	20
- NOSR 3 Decrease due to requirements for groundwater monitoring program.	-	120
Program Direction		
- Headquarters Increase due to Federal salary adjustments.	+	36
- Reserve No. 3 & NOSRs Decrease due to requirements for miscellaneous contractual services.	-	40
- Reserve Nos. 1 & 2 Increase due to Federal salary adjustments.	+	125
Total	$	141,239
Use of Prior Year Balance	+	18,461
FY 1988 Congressional Budget Request	$	159,700

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY SUMMARY

Naval Petroleum and Oil Shale Reserves

I. **Preface:** Reserves Nos. 1&2, California (Bechtel Petroleum Operations Inc., Unit Operator)

The objective at Reserves Nos. 1&2 (NPR 1&2) is to produce the field at the maximum efficient rate and consistent with sound engineering practices without detriment to ultimate recovery. To this end, activities are conducted in four major areas: Operations and Maintenance, Development Drilling, Exploration Drilling and Development Facilities. Operations and Maintenance funds the daily activities necessary to operate and produce the Reserves. This includes the maintenance and repairs of facilities and equipment, financial management, engineering expertise to direct and monitor development of the Reserves, administrative support, legal services, remedial workovers, and environmental, safety, security and quality assurance support. Development Drilling provides for the wells necessary to develop and maintain production. While primary development of the Reserves has essentially been completed, some infill production wells will continue to be drilled. However, the focus of the drilling program will be on wells required to support recovery techniques such as waterflood. This will include injection wells, new producers, water source wells and water disposal wells. Exploration Drilling funds the drilling of wells to discover new hydrocarbon reserves and increase the ultimate recovery potential of the Reserves. In addition, it provides geological data which is used in the formulation of the various development strategies necessary to produce the field's proven reserves. A deep test exploratory well currently underway is planned for completion and evaluation in FY 1987. No exploration wells are planned for FY 1988. Exploration wells will be drilled in the future as candidate sites are developed, if the field has not been sold. Development Facilities provides for the purchase and installation of facilities necessary for continued production of the field. This includes construction to implement new development initiatives, modification of existing facilities to respond to changing field conditions, and to meet applicable environmental and safety regulations.

II.

A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Operations & Maintenance	$ 93,826	$ 96,698	$111,071	+ 15
Development Drilling	17,900	22,900	18,704	- 18
Exploration Drilling	19,421	3,800	---	-100
Development Facilities	10,653	8,000	20,480	+156
Total, Reserves Nos. 1&2	$141,800	$131,398	$150,255	+ 14

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Operations & Maintenance	Performed required managerial and administrative functions: -General management -Auditing -Planning and control -Legal services -Finance -Human resources -Material control/warehousing -Acquisitions (purchasing/subcontracts) -Automated data processing -Office services Obligations of $14,450.	Perform required managerial and administrative functions: -General management -Auditing -Planning and control -Legal services -Finance -Human resources -Material control/warehousing -Acquisitions (purchasing/subcontracts) -Automated data processing -Office services Obligations of $16,200.	Perform required managerial and administrative functions: -General management -Auditing -Planning and control -Legal services -Finance -Human resources -Material control/warehousing -Acquisitions (purchasing/subcontracts) -Automated data processing -Office services Obligations of $16,992.
	Performed routine operation and maintenance of the following production related facilities: -Approx. 1,600 active wells -56 Tank settings -70 Gas/oil separation stations -700 Miles of pipelines -5 Oil cleaning LACT stations -5 Waste water disposal facilities -4 Waste water injection facilities -30,000 Hp of pumps -Cathodic protection system -Electrical usage & distribution system -Maintenance control -Building maintenance Obligations of $35,463.	Perform routine operation and maintenance of the following production related facilities: -Approx. 1,600 active wells -56 Tank settings -70 Gas/oil separation stations -700 Miles of pipelines -5 Oil cleaning LACT stations -5 Waste water disposal facilities -4 Waste water injection facilities -30,000 Hp of pumps -Cathodic protection system -Electrical usage & distribution system -Maintenance control -Building maintenance Obligations of $37,100.	Perform routine operation and maintenance of the following production related facilities: -Approx. 1,600 active wells -56 Tank settings -70 Gas/oil separation stations -700 Miles of pipelines -5 Oil cleaning LACT stations -5 Waste water disposal facilities -4 Waste water injection facilities -30,000 Hp of pumps -Cathodic protection system -Electrical usage & distribution system -Maintenance control -Building maintenance Obligations of $38,267.
	Performed routine operation and maintenance of the following gas processing/collection facilities: -3 Gas processing plants -45 Product storage tanks -100,000 Hp of compressors -Fire protection systems -Outside gas processing Obligations of $15,052.	Perform routine operation and maintenance of the following gas processing/collection facilities: -3 Gas processing plants -45 Product storage tanks -100,000 Hp of compressors -Fire protection systems -Outside gas processing Obligations of $13,620.	Perform routine operation and maintenance of the following gas processing/collection facilities: -3 Gas processing plants -45 Product storage tanks -100,000 Hp of compressors -Fire protection systems -Outside gas processing -Additional funding is requested for increased outside gas processing charges and maintenance requirements. Obligations of $16,120.

III. Reserves Nos. 1&2 (continued)

Program Activity	FY 1986	FY 1987	FY 1988
Operations & Maintenance (continued)	Completed of 134 major remedial workover jobs. Obligations of $10,050.	Completion of 120 major remedial workover jobs. Obligations of $10,100.	Completion of 175 major remedial workover jobs. Obligations of $17,400.
	Performed required technical support functions: -Production engineering -Reservoir/geological engineering -Drafting -Reservoir studies -Systems engineering -Design engineering -Cathodic protection/corrosion engineering -Electrical engineering -Construction -Laboratory services -Gauging -Drilling and downhole well work supervision These engineering functions are required to maintain reservoirs and facilities in optimum condition to comply with MER requirements. Obligations of $11,020.	Perform required technical support functions: -Production engineering -Reservoir/geological engineering -Drafting -Reservoir studies -Systems engineering -Design engineering -Cathodic protection/corrosion engineering -Electrical engineering -Construction -Laboratory services -Gauging -Drilling and downhole well work supervision These engineering functions are required to maintain reservoirs and facilities in optimum condition to comply with MER requirements. Obligations of $11,078.	Perform required technical support functions: -Production engineering -Reservoir/geological engineering -Drafting -Reservoir studies -Systems engineering -Design engineering -Cathodic protection/corrosion engineering -Electrical engineering -Construction -Laboratory services -Gauging -Drilling and downhole well work supervision These engineering functions are required to maintain reservoirs and facilities in optimum condition to comply with MER requirements. Obligations of $12,105.
	Performed the following technical assurance functions: -Management -Safety -Security -Environmental protection -Quality assurance This includes: waste management, air quality, assurance programs, industrial hygiene, fire protection, safety inspections, physical and personnel security, emergency preparedness and traffic safety. Obligations of $3,791.	Perform the following technical assurance functions: -Management -Safety -Security -Environmental protection -Quality assurance This includes: waste management, air quality, assurance programs, industrial hygiene, fire protection, safety inspections, physical and personnel security, emergency preparedness and traffic safety. Obligations of $4,500.	Perform the following technical assurance functions: -Management -Safety -Security -Environmental protection -Quality assurance This includes: waste management, air quality, assurance programs, industrial hygiene, fire protection, safety inspections, physical and personnel security, emergency preparedness and traffic safety. Obligations of $5,187.
	Operator fee. Obligations of $4,000.	Operator fee. Obligations of $4,100.	Operator fee. Obligations of $5,000.
Total, Operations & Maintenance	$93,826	$96,698	$111,071

III. Reserves Nos. 1&2 (continued)

Program Activity	FY 1986	FY 1987	FY 1988
Development Drilling	Drilled 23 new wells and performed 30 well completions. Obligations of $17,900.	Drill 35 development wells, including producers and injectors. Obligations of $22,900.	Drill 38 development wells, including producers and injectors. Obligations of $18,704.

FY 1988 Drilling Program

Zone	No. of Wells	Avg. Cost	Total Cost	Production/Injection
Tulare				
Water disposal	4	$117	$468	6,000 BWD/well
Water source	1	$551	$551	
SOZ				
Redrills	18	$160	$2,880	100 BOPD/well
Stevens				
Water injection	5	$891	$4,455	1,900 BWD/well
Producers	10	$1,035	$10,350	222 BOPD/well
Total	38		$18,704	

Program Activity	FY 1986	FY 1987	FY 1988
Exploration Drilling	Drilled 7,132 feet on the deep test exploratory well to a depth of 15,932 feet. Obligations of $19,421.	Complete deep test exploratory well begun in FY 1985, and drill and test Carneros exploratory well. Obligations of $3,800.	No activity. $0.

III. Reserves Nos. 1&2 (continued)

Program Activity	FY 1986	FY 1987	FY 1988
Development Facilities	Constructed and modified existing facilities necessary to maintain production, ensure safety and comply with environmental regulations. Obligations of $5,453.	Construct, modify or expand existing facilities necessary to maintain production, ensure safety and comply with environmental regulations. Obligations of $8,000.	Construct, modify or expand existing facilities necessary to maintain production, ensure safety and comply with environmental regulations. Obligations of $20,480.
	Replaced high pressure gas line from 30R to 17Z. Obligations of $5,200.	No activity. $0.	No activity. $0.
	Produced an average of 115,525 BOPD, 349 MMCF/D of natural gas and 633 MG/D of liquid products.	Produce an estimated 111,000 BOPD, 350 MMCF/D of natural gas and 688 MG/D of liquid products.	Produce an estimated 106,000 BOPD, 379 MMCF/D of natural gas and 750 MG/D of liquid products.
	Sold an average of 90,482 BOPD, 105 MMCF/D of natural gas and 506 MG/D of liquid products.	Sell an estimated 85,000 BOPD, 146 MMCF/D of natural gas and 537 MG/D of liquid products.	Sell an estimated 83,000 BOPD, 139 MMCF/D of natural gas and 585 MG/D of liquid products.
	Generated gross revenues of $740 million.	Generate estimated gross revenues of $590 million.	Generate estimated gross revenues of $681 million.
Total, Reserves Nos. 1&2	$141,800	$131,398	$150,255

I. Preface: Reserve No. 3, Wyoming (Lawrence-Allison and Associates West, Inc., Contractor)

The objective of the NPR-3 program is to produce the field at the maximum efficient rate consistent with sound engineering practices. Funding is provided for conventional oil field management and operations and enhanced recovery operations within the categories of Operations and Maintenance, Development Drilling and Development Facilities. Operations and Maintenance provides for the necessary daily activities to produce the Reserve. This includes operation, maintenance and repair of facilities and equipment; engineering support to direct and monitor field development; financial management; administrative support; technical support; purchase of field equipment, and environmental, safety and security support. Development Drilling provides for the wells necessary to develop and maintain production. The focus of the drilling program is directed towards continued development of known productive formations through in-fill drilling and increased development of the deeper producing zones. Development Facilities provides for the implementation of enhanced recovery techniques to produce oil which is otherwise not recoverable. Pilot projects to determine the economic and technical viability of several methods have been implemented. Data is being gathered and will be evaluated during the FY 1986-87 timeframe. Should one or more of these methods prove successful, a design and engineering plan for expansion will be developed in FY 1987 with implementation scheduled to begin in FY 1988.

It should be noted that with the reduced revenues due to low oil prices, NPR-3 has instituted cost reduction measures to ensure the profitability of the program. Dependent upon future oil prices, these efforts will continue.

II.

A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Operations & Maintenance	$ 11,898	$ 15,798	$ 13,166	- 17
Development Drilling	4,929	6,754	4,176	- 38
Development Facilities	451	250	4,398	+1659
Total, Reserve No. 3	$ 17,278	$ 22,802	$ 21,740	- 5

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Operations and Maintenance	Performed routine operation and maintenance of the following production related facilities: -Petroleum handling facilities including treating, storage, pumping, flowline, gathering, sales and testing facilities -Gas collection, processing, and injection facilities including injection wells, gathering and compression systems, distribution and sales systems, vapor recovery and the LTS gas plant -Waterflood facilities -Supervise servicing and maintenance of all producing wells (35 to 40 wells per month) -Supervise chemical treatment program -Direct and monitor EOR steamflood project -Maintenance, repair and fuel for DOE owned heavy field equipment Obligations of $5,113.	Perform routine operation and maintenance of the following production related facilities: -Petroleum handling facilities including treating, storage, pumping, flowline, gathering, sales and testing facilities -Gas collection, processing, and injection facilities including injection wells, gathering and compression systems, distribution and sales systems, vapor recovery and the LTS gas plant -Waterflood facilities -Supervise servicing and maintenance of all producing wells (35 to 40 wells per month) -Supervise chemical treatment program -Direct and monitor EOR steamflood project -Maintenance, repair and fuel for DOE owned heavy field equipment Obligations of $6,680.	Perform routine operation and maintenance of the following production related facilities: -Petroleum handling facilities including treating, storage, pumping, flowline, gathering, sales and testing facilities -Gas collection, processing, and injection facilities including injection wells, gathering and compression systems, distribution and sales systems, vapor recovery and the LTS gas plant -Waterflood facilities -Supervise servicing and maintenance of all producing wells (35 to 40 wells per month) -Supervise chemical treatment program -Direct and monitor EOR steamflood project -Maintenance, repair and fuel for DOE owned heavy field equipment Obligations of $5,704.
	Performed routine maintenance and repair for buildings, utilities and roads including: -Buildings and storage areas -Utility systems and electrical power -Roads and grounds -Fences and bridges -Revegetation -Field clean-up -Oil spill containment Obligations of $732.	Perform routine maintenance and repair for buildings, utilities and roads including: -Buildings and storage areas -Utility systems and electrical power -Roads and grounds -Fences and bridges -Revegetation -Field clean-up -Oil spill containment Obligations of $1,352.	Perform routine maintenance and repairs for buildings, utilities and roads including: -Buildings and storage areas -Utility systems and electrical power -Roads and grounds -Fences and bridges -Revegetation -Field clean-up -Oil spill containment Obligations of $1,413.
	Purchased drilling rig to replace defective rig. Obligations of $250.	No activity. $0.	No activity. $0.

III. Reserve No. 3 (continued)

Program Activity	FY 1986	FY 1987	FY 1988
Operations & Maintenance (continued)	Performed required management and technical support functions: -Scheduling and planning -Overall management of field operations and EOR -Technical surveillance -Quality assurance -Petroleum geology -Reservoir engineering -Drilling/production engineering -Design and construction -Reservoir studies. Obligations of $1,884.	Perform required management and technical support functions: -Scheduling and planning -Overall management of field operations and EOR -Technical surveillance -Quality assurance -Petroleum geology -Reservoir engineering -Drilling/production engineering -Design and construction -Reservoir studies. Obligations of $3,331.	Perform required management and technical support functions: -Scheduling and planning -Overall management of field operations and EOR -Technical surveillance -Quality assurance -Petroleum geology -Reservoir engineering -Drilling/production engineering -Design and construction -Reservoir studies. Obligations of $2,257.
	Performed required administrative support functions: -Management information system -Accounting -Constract/procurement -Property management -Space and vehicle rental -Office supplies -Insurance -Corporate overhead -Safety -Security -Environmental protection -Operator fee. Obligations of $3,919.	Perform required administrative support functions: -Management information system -Accounting -Contracts/procurement -Property management -Space and vehicle rental -Office supplies -Insurance -Corporate overhead -Safety -Security -Environmental protection -Operator fee. Obligations of $4,435.	Perform required administrative support functions: -Management information system -Accounting -Contracts/procurement -Property management -Space and vehicle rental -Office supplies -Insurance -Corporate overhead -Safety -Security -Environmental protection -Operator fee. Obligations of $3,792.
Total, Operations & Maintenance	$11,898	$15,798	$13,166
Development Drilling	Drilled and completed 17 Second Wall Creek infill wells, 18 Shannon infill wells, and 28 deep zone wells. Installed flowlines and electrical connections. Obligations of $4,929.	Drill 30 Shannon infill wells, 18 Second Wall Creek infill wells and 4 Lakota-Dakota wells and install flowlines and electrical connections. Obligations of $6,754.	Drill 29 Second Wall Creek infill development wells and install flowlines and electrical connections. Obligations of $4,176.

III. Reserve No. 3 (continued)

Program Activity	FY 1986	FY 1987	FY 1988
Development Facilities	Initiated 20 acre pilot project to steamflood the Shannon Reservoir. Obligations of $451.	Develop and prepare engineering and design plans for the Shannon Reservoir enhanced production project. Obligations of $250.	Initiate expansion of enhanced production project for the Shannon Reservoir: -Purchase and install 2 steam generators and related equipment -Drill injection wells -Flood 120 acre increment of the Shannon Reservoir. Obligations of $4,398.
	Produced an estimated 3,100 BOPD, 8 MMCF/D of natural gas (for injection only) and 13 MG/D of liquid products. Generated revenues of $23 million.	Produce an estimated 3,100 BOPD, 10 MMCF/D of natural gas (for injection only) and 13 MG/D of liquid products. Generate estimated revenues of $18 million.	Produce an estimated 3,100 BOPD, 10 MMCF/D of natural gas and 13 MG/D of liquid products. Generate estimated revenues of $19 million.
Total, Reserve No. 3	$17,278	$22,802	$21,740

I. Preface: Naval Oil Shale Reserves, Colorado and Utah

The objective of the NOSR program is to protect and maintain the Government's resources at the NOSRs. The FY 1988 program will focus on continuing activities. This includes land management activities conducted through the Bureau of Land Management, and groundwater monitoring activities for the spent oil shale pile at Anvil Points. Decommissioning of the Anvil Points facility was completed in FY 1986 and monitoring of the spent oil shale pile to mitigate any adverse environmental conditions stemming from the shale pile remains as an on-going activity. The plan to protect the natural gas resources of NOSR-3 from drainage by adjacent private development has been deferred at this time due to the low marketability of natural gas. This will not affect drainage of the Government's resources as most of the private development has also shut down. Should the market for natural gas change and private production resume, the drilling program will be reinitiated.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Naval Oil Shale Reserves	$ -87	$ 2,038	$ 210	-90

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Naval Oil Shale Reserves	Conducted a variety of activities to protect, conserve and maintain the Government's resources at the NOSRs. This included: -Completed decommissioning of the Anvil Points facility -Continued land management activities through BLM -Drilled second well of NOSR-3 gas protection plan -Provided minor maintenance and security at the NOSRs Deobligations of $87.	Conduct a variety of activities to protect, conserve and maintain the Government's resources at the NOSRs. This includes: -Initiate groundwater monitoring activities for the spent shale pile to ensure environmental pollution is not taking place -Continue land management activities through BLM -Purchase water rights to Ruedi Reservoir -Provide annual operation and maintenance fee for the Ruedi Reservoir -Participate in drilling of 7 communitized wells at NOSR-3 -Provide for minor maintenance requirements Obligations of $2,038.	Conduct a variety of activities to protect, conserve and maintain the Government's resources at the NOSRs. This includes: -Continue groundwater monitoring to ensure environmental compliance -Continue land management activities through BLM -Provide annual operation and maintenance fee for the Ruedi Reservoir -Provide for minor maintenance requirements Obligations of $210.
Total, Naval Oil Shale Reserves	-$87	$2,038	$210

I. Preface: Program Direction

This activity provides funding for the FTEs necessary to direct, manage and monitor program operations to ensure that program objectives are achieved in a timely and efficient manner. This includes establishing goals and objectives, developing policy, and monitoring contractor operations. Government support is provided both at Headquarters and on-site, and includes planning, financial management, administrative support, engineering, ADP, procurement, environment and safety.

A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Headquarters	$ 1,252	$ 2,164	$ 1,700	-21
Reserve No. 3 & NOSRs	721	835	795	- 5
Reserves Nos. 1 & 2	3,214	3,007	3,000	0
Total, Program Direction	$ 5,187	$ 6,006	$ 5,495	- 8

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Headquarters (Washington, DC)	Provided overall management of Reserves (23 FTEs): -Policy and planning -Engineering -Facilities -Financial management -ADP -Procurement -Personnel -Environmental support -Safety Obligations of $1,252.	Provide overall management of the Reserves (22 FTEs): -Policy and planning -Engineering -Facilities -Financial management -ADP -Procurement -Personnel -Environmental support -Safety Obligations of $1,664.	Provide overall management of the Reserves (22 FTEs): -Policy and planning -Engineering -Facilities -Financial management -ADP -Procurement -Personnel -Environmental support -Safety Obligations of $1,700.

III. Program Direction (continued)

Program Activity	FY 1986	FY 1987	FY 1988
Headquarters (continued)	No activity. $0.	Prepare a Report to Congress on the results of divestiture studies by June 30 1987. Obligations of $500.	No activity. $0.
Reserve No. 3 & NOSRs (Wyoming)	Provided on-site management of Reserve (16 FTEs): -Engineering -Facilities construction -Policy and planning -Financial management -ADP -Procurement -Personnel -Environmental support -Safety Obligations of $721.	Provide on-site management of the Reserve (15 FTEs): -Engineering -Facilities construction -Policy and planning -Financial management -ADP -Procurement -Personnel -Environmental support -Safety Obligations of $835.	Provide on-site management of the Reserve (15 FTEs): -Engineering -Facilities construction -Policy and planning -Financial management -ADP -Procurement -Personnel -Environmental support -Safety Obligations of $795.
Reserves Nos. 1&2 (California)	Provided on-site management of the Reserves (65 FTEs): -Engineering -Construction -Financial -Planning -ADP -Environment -Safety -Administrative services Obligations of $3,214.	Provide on-site management of the Reserves (58 FTEs): -Engineering -Construction -Financial -Planning -ADP -Environment -Safety -Administrative services Obligations of $3,007.	Provide on-site management of the Reserves (58 FTEs): -Engineering -Construction -Financial -Planning -ADP -Environment -Safety -Administrative service Obligations of $3,000.
Total, Program Direction	$ 5,187	$ 6,006	$ 5,495
Subtotal Naval Petroleum and Oil Shale Reserves	$164,178	$162,244	$177,700
Use of Prior Year Balances	-$151,176	-$ 40,067	-$ 18,000
Total, Naval Petroleum and Oil Shale Reserves	$ 13,002	$122,177	$159,700

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY SUMMARY

CONSTRUCTION PROJECTS

Naval Petroleum and Oil Shale Reserves

IV. A. Construction Project Summary

Project Title	Total Prior Year Obligations	FY 1987 Appropriated	FY 1988 Request	Remaining Balance	TEC
Reserves Nos. 1&2					
Modify 35R Gas Plant Fire Water System	$ ---	$ ---	$ 200	$ ---	$ 200
Revamp Flare System 35R/NPI Gas Plants	---	---	2,000	---	2,000
Oil/Water Separator at 27R Truck Washout	---	---	400	---	400
Low Pressure Compressor at 33S	---	---	1,050	---	1,050
Low Pressure Compressor at 30R	---	---	1,010	---	1,010
High Pressure Gas Dehydration Facilities at 33S	---	---	300	---	300
Increase Process Capacity at LTS No. 1 and LTS No. 2	---	---	1,000	3,000	4,000
Unscheduled Projects	---	---	3,400	---	3,400
Stevens Waterflood Expansion	---	---	3,000	3,293	6,293
Modify 29R Shale Stevens Tank Settings	---	---	1,180	---	1,180
Modify MBB/W31S Stevens Tank Settings	---	---	2,460	---	2,460
Modify 26R Sand Stevens Tank Settings	---	---	230	---	230
Modify 31S (C&D Shale) Stevens Tank Settings	---	---	250	---	250
Stevens Artificial Lift Equipment	---	---	4,000	---	4,000
Total, Reserves Nos. 1&2	$ ---	$ ---	$20,480	$ 6,293	$26,773
Reserve No. 3					
Shannon Reservoir Enhanced Production Project	$ 451	$ 250	$ 4,398	$ ---	$ 5,099

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expense Funded Construction Project

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1. **Project title and location:** Flare System Revamp-35R Gas Plant and High Pressure Injection Facility Reserves Nos. 1&2, California

Project TEC: $2,000
Start Date: 1Q-FY88
Completion Date: 4Q-FY88

2. **Financial schedule:** (Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$2,000	$0

3. **Narrative:**

Revamp of the flare header system between the 35R gas plant and the high pressure injection facility is required. The existing flare header is undersized and unsafe due to numerous additional relief values being connected to it over the years, and is not in compliance with environmental and safety regulations. Redesign and rebuild of the system is required if the facilities are to operate in compliance with the applicable regulations. The funds requested provide for pipe, pumps, valve flanges, separators and electrical equipment. Production losses which would result from shut-down of the 35R gas plant are estimated at 44 MMCF/D of gas and 4,400 BOPD.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expense Funded Construction Project

---

1. Project title and location: Install Low Pressure Gas
Compressor at 33S
Reserves Nos. 1&2, California

Project TEC: $1,050
Start Date: 1Q-FY88
Completion Date: 4Q-FY88

2. Financial schedule:
(Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$1,050	$0

3. Narrative

This project provides for the design, construction and installation of one low pressure gas compressor at 33R to boost increasing gas production from the east end of the field and to provide maintenance capacities. Low pressure compression capacity requirements are expected to increase as a result of proposed remedial work, gas lift and waterflood activities. If compressor capacity is not increased, production would be constrained by 7 MMCFPD of gas and 2,300 BOPD. The proposed unit would be a 1,000 BHP unit with skid scrubbers, heat exchangers and auxiliary equipment.

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NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expense Funded Construction Project

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1. Project title and location: Install Low Pressure Gas Compressor at 30R Reserves Nos. 1&2, California

Project TEC: $1,010
Start Date: 1Q-FY88
Completion Date: 4Q-FY88

2. Financial schedule: (Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$1,010	$0

3. Narrative

This project provides for the design, construction and installation of one low pressure gas compressor at 30R to boost increasing gas production from the west end of the field. Low pressure compression capacity requirements are expected to increase as a result of proposed remedial work, gas lift and waterflood activities. If compressor capacity is not increased, production would be constrained by 7 MMCFPD of gas and 2,300 BOPD. The proposed unit would be a 1,000 BHP unit with skid scrubbers, heat exchangers and auxiliary equipment.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expenses Funded Construction Project

---

1. Project title and location: Increase Process Capacity at LTS Nos. 1&2 Reserves Nos. 1&2, California

Project TEC: $4,000
Start Date: 1Q-FY88
Completion Date: 1Q-FY90

2. Financial schedule:
(Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$1,000	$3,000

3. Narrative

Due to increasing gas production, the process capacity at the 35R gas complex will be exceeded by approximately 100 MCF/D in FY 1987. The 35R LTS plants are equipped with fractionation capabilities which exceed current needs. However, the recovery sections of each plant limit process capacity to 120 MMCF/D at each plant. By paralleling the recovery section (the gas handling portion including scrubbers, exchangers, chillers, LTS vessels and glycol system), it is estimated that process capacity could be increased to 170 MMCF/D at each plant. This would allow the additional forecasted gas production to be processed, resulting in greater natural gas liquids recovery and a reduction in gas dehydration requirements.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

C. Operating Expense Funded Construction Project

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1. Project title and location: Unscheduled Requirements
Reserves Nos. 1&2, California

Project TEC: $3,400
Start Date: 1Q-FY88
Completion Date: 4Q-FY88

2. Financial schedule.
(Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$3,400	$0

3. Narrative

Additions, modifications and repairs to facilities are required each year due to unplanned/unforeseen occurences. These include (1) safety compliance, (2) environmental compliance, (3) maintain or increase production, and (4) reduce operating costs. Because these projects are of an unplanned nature they cannot be defined at this time. Based on past experience, it is necessary that funding be provided to meet operational requirements which arise during the year. During the first half of FY 1986, 70 such project at a cost of $6,466,000 were identified. A sampling of these projects includes the following:

Project	$(000)
Temporary repair to high pressure gas line 30R-17R	$1,067
Repair firewater loop-35k gas plant	42
Reroute flow line 38Z-25Z	150
Replace/repair 6" 24Z wast water line	210
Dry Gas Zone environmental compliance	1,000
Replace 8" 20S-21S SOZ line	100
Install gas dehydration at 33S compressor station	1,000
Change pressure controls at LTS Nos. 1&2	40
Increase lean oil cooling - 35R	125
Vapor recovery system modifications at Stevens tank settings 1-17R	400

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expense Funded Construction Project

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1. Project title and location: Stevens Waterflood Expansion
Reserves Nos. 1&2, California

Project TEC: $6,293
Start Date: 1Q-FY88
Completion Date: 4Q-FY91

2. Financial schedule:
(Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$3,000	$3,293

3. Narrative

Based on the performance of an existing Tulare water sourced waterflood, it is planned to expand two high pressure sources for injection water (33S and 17R plants) to provide Tulare water for increased injection into the Stevens Zone at the MBB/W31S reservoir, NWR reservoir, 24Z reservoir, 2B reservoir, and 26R reservoir. Implementation of this project includes the facilities necessary to support the expansion of Tulare water sources, water injection wells, and producers to augment in-place capabilities. The funds requested in FY 1988 provide for the necessary facilities for the NWR and 24R reservoirs.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expense Funded Construction Project

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1. Project title and location: Modify 29R Shale Stevens Tank Settings
Reserves Nos. 1&2, California

Project TEC: $1,180
Start Date: 1Q-FY88
Completion Date: 4Q-FY88

2. Financial schedule:
(Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$1,180	$0

3. Narrative

This project provides for the modification of four tank settings which service the 29R Shale Stevens pool. These modifications will increase tank setting capacity and allow for production increases estimated at 2,078 BOPD and 3,118 MCFPD. This project provides for the design, construction and installation of surge tanks, text separators, transfer pumps, back pressure gas control valves, and interconnecting piping. Payout of the project is estimated at approximately one month.

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FY 1988 CONGRESSIONAL BUDGET REQUEST
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expense Funded Construction Project

---

1. Project title and location: Modify MMB/W31S Stevens
Tank Settings
Reserves Nos. 1&2, California

Project TEC: $2,460
Start Date: 1Q-FY88
Completion Date: 4Q-FY88

2. Financial schedule:
(Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$2,460	$0

3. Narrative

This project provides for the modification of nine tank settings which service the MBB/W31S pools. These modifications will increase tank setting capacity and provide needed gas and liquid separation facilities to handle expected production increases estimated at 19,697 BOPD and 29,548 MCFPD. This project provides for the design, construction and installation of surge tanks, test separators, transfer pumps, back pressure gas control valves, and interconnecting piping. Payout of the project is estimated at approximately 6 days.

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NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expense Funded Construction Project

1. Project title and location: Stevens Artificial Life
Reserves Nos. 1&2, California

Project TEC: $4,000
Start Date: 1Q-FY88
Completion Date: 4Q-FY88

2. Financial schedule:
(Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$4,000	$0

3. Narrative

This project provides for the purchase and installation of pumping units for 20 Stevens wells. Due to the response of waterflood activities and declining reservoir pressure, artificial lift equipment is required to maintain oil production. Funds will be used to purchase and install variable speed electric submersible pumping units with gas separators in 10 Stevens wells (mainly the 31S structure), pump cable, wellhead, control panel, transformers and overhead power from the main distribution system. Additionally, 10 rod pumping units and related equipment will be installed in Stevens wells located in the 29R, NWR, 24Z and 26R structures. Artificial lift equipment will be installed on an individual well basis as justified by MER production determinations.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expense Funded Construction Project

---

1. Project title and location: Miscellaneous
Reserves Nos. 1&2, California

Project TEC: $1,380
Start Date: 1Q-FY88
Completion Date: 4Q-FY88

2. Financial schedule:
(Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$0	$0	$1,380	$0

3. Narrative

The following miscellaneous projects are requested for FY 1988:

1. Oil/Water seperator at truck washout ($400) - Construct enclosed oil/water separator system to replace the oil reclamation and truck washout sumps at the 27R Class II disposal site. Required for environmental compliance.

2. Modify 31S Stevens tank setting ($250) - Increase one tank setting capacity to permit increased production from the 31S pool estimated at 1,630 BOPD and 2,445 MCFPD of gas. Includes transfer pumps, text separator, interconnecting lines, well manifolds and gas control valves. Payout estimated at 8 days.

3. Modify 26R Sand Stevens tank setting ($230) - Increase one tank setting capacity to permit increased production from the 26R sand estimated at 2,275 BOPD and 3,413 MCFPD of gas. Includes transfer pumps, test separator, interconnecting lines and gas control valves. Payout estimated at 6 days.

4. High pressure gas dehydration facilities at 33S (300) - Transportation of wet gas from 33S to 35R has resulted in accelerated pipeline corrosion rates, hydrate freeze-ups, and decrease in pipeline pressure. Installation of a glycol dehydration system at the 33S compressor station will minimize these problems and reduce associated production losses.

5. Modify 35R gas plant fire water system ($200) - Replace existing 6" line, in which two failures due to corrosion have occured in the last two years, with 8" line to ensure a reliable means of water protection at the 35R plant.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

KEY ACTIVITY CONSTRUCTION PROJECT SUMMARY

Naval Petroleum and Oil Shale Reserves

IV. C. Operating Expense Funded Construction Project

---

1. Project title and location: Shannon Reservoir Enhanced Production Project
Reserve No. 3, Wyoming

Project TEC: $5,099
Start Date: 2Q-FY88
Completion Date: 4Q-FY88

2. Financial schedule:
(Budget Authority)

Prior Year	FY 1986 Actual	FY 1987 Appropriated	FY 1988 Request	To Complete
$0	$451	$250	$4,398	$0

3. Narrative:

The Shannon Reservoir is a shallow low-pressure formation estimated to have originally contained 144 million barrels of oil, of which only 5 percent will be recovered through primary means. Because of the large amount of oil that will be left unrecovered after primarily means, efforts are underway to determine if a portion of that oil can be economically recovered through enhanced oil recovery (EOR) processes or in-fill drilling.

Three recovery methods are currently under consideration (1) steamflooding, (2) in-situ combustion, and (3) in-fill drilling (reduce well spacing from 10 to 5 acres). All data from the in-situ combustion pilot test have been collected, and field testing of steamflooding is still being performed. A design plan for enhanced production will be developed in FY 1987 based on economic and technically viability of the three processes, and will be implemented in FY 1988. The funds requested provide for the first phase of the steamflood project.

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FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

OBJECT CLASS

NAVAL PETROLEUM AND OIL SHALE RESERVES

Direct Funding:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
11.1 Full-time	$ 3,590	$ 3,455	$ 3,709
11.3 Other than full-time	59	36	36
11.5 Other compensation	98	115	97
11.8 Special personal services	469	540	503
11.9 Total personnel compensation	$ 4,216	$ 4,146	$ 4,345
12.1 Personnel benefits	$ 471	$ 419	$ 455
13.0 Benefits for former personnel	2	---	---
21.0 Travel	189	221	222
22.0 Transportation of things	27	21	5
23.2 Rental payments to others	3	10	10
23.3 Communications, utilities and other rent	30	83	---
24.0 Printing and reproduction	3	4	1
25.0 Other services	160,984	157,265	172,612
26.0 Supplies and materials	53	75	50
31.0 Equipment	3	---	---
41.0 Grants, subsidies and contributions	(12)	---	---
Total direct obligations	$165,969	$162,244	$177,700

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
NAVAL PETROLEUM AND OIL SHALE RESERVES
(dollars in thousands)

CONTRACTOR LIST

NAVAL PETROLEUM AND OIL SHALE RESERVES

	Estimated Amount
Reserves Nos. 1 & 2	
Unit operator	$149,200
Habitat restoration and endangered species	1,055
Subtotal	$150,255
Reserve No. 3	
Contractor/operator	$ 20,188
Motor pool services	206
Electric utility services	1,346
Subtotal	$ 21,740
Naval Oil Shale Reserves	
Land management	$ 70
Environmental mitigation	50
Miscellaneous maintenance	90
Subtotal	$ 210
Program Direction	
Technical support services	$ 250
Total, NPOSR	$172,455

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

ENERGY CONSERVATION

VOLUME 4

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ENERGY CONSERVATION

For necessary expenses in carrying out energy conservation activities, [$280,129,000,] $81,090,000, to remain available until expended [, of which $10,000,000 shall be available for a grant for an energy demonstration and research facility at Tufts University when authorized by an Act of Congress: Provided, That award of such grant may be made only upon approval of an appropriate technical review panel convened by the Department of Energy for the specific purpose of reviewing such grant application and subject to conditions, if any, contained in legislation authorizing such project, and of which $112,450,000 for the Weatherization Assistance Program authorized by Part A of the Energy Conservation in Existing Buildings Act of 1976 (42 U.S.C. 6861 et. seq.) and the Institutional Conservation Program authorized by Part G of title III of the Energy Policy and Conservation Act (42 U.S.C. 6371 et. seq.) shall be available effective March 1, 1987, only in such sums (up to a total of $112,450,000) as are equal to the difference between $200,000,000 and the excess amount for fiscal year 1987 disbursed by the Secretary of Energy for use in energy conservation programs under the provisions of section 3003(d) of subtitle A of title III of the conference agreement on H.R. 5300, the Omnibus Budget Reconciliation Act of 1986, or equivalent legislation enacted into law by March 1, 1987: Provided further, That if no such legislation is enacted into law by March 1, 1987, effective such date, such sums ($112,450,000) shall be immediately available to be derived from amounts held administratively in escrow by the Secretary of Energy pending restitution for actual or alleged petroleum product violations under the Emergency Petroleum Allocation Act of 1973 or the Economic Stabilization Act of 1970 (and the regulations issued thereunder): Provided further, That $2,000,000 of the amount provided under this heading shall be available for continuing a research and development initiative with the National Laboratories for new technologies up to proof-of-concept testing to increase significantly the energy efficiency of processes that produce steel: Provided further, That obligation of funds for these activities shall be contingent on an agreement to provide cash or in-kind contributions to the initiative or to other collaborative reseach and development activities related to the purpose of the initiative equal to 30 percent of the amount of Federal Government obligations: Provided further, That existing facilities, equipment, and supplies, or previously expended research or development funds are not acceptable as contributions for the purposes of this appropriation, edxcept as amortized, depreciated, or expensed in normal business practice: Provided further, That the total Federal expenditure under this proviso shall be repaid up to one and half times from the proceeds of the commercial sale, lease, manufacture, or use of technologies developed under this proviso, at a rate of one-fourth of all net proceeds]. (Department of the Interior and Related Agencies Appropriations Act, 1987, as included in Public Laws 99-500 and 99-591, section 101(h).)

Explanation of Change

Deletes Language contained in Public Laws 99-500 and 99-591 which had specific application to Fiscal Year 1987.

Deletes Language concerning procedures to follow to make excess Petroleum Overcharge Restitution funds available to the states; since the instructions were contingent upon enactment of other legislation and since we now have direct Appropriations, such guidance is no longer necessary.

Deletes Language providing for funds supporting the Steal initiative and a method and rate of repayment because the program is not affordable in light of current fiscal constraints.

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ENERGY CONSERVATION

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Request
Transportation	$ 57,457	$ 56,055	$ 22,409
Industrial	40,708	35,026	16,035
Buildings and Community Systems	37,862	30,450	14,578
Multi-Sector	25,922	28,304	20,406
Facilities	9,830	10,000	---
Cooperative Venture R&D Pools	---	---	5,000
Policy and Management - CE(EC)	1,726	1,862	1,662
Subtotal, Conservation R&D	173,505	161,697	80,090
State and Local	262,562	213,500	6,000
Subtotal, Energy Conservation	436,067	375,197	86,090
Less Use of Prior Year Balances and Other Adjustments	-9,880	-225,518	---
Total, Energy Conservation	$426,187	$ 149,679	$ 86,090

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION

OVERVIEW

Buildings and Community Systems

The Nation's buildings sector consumed approximately 26 quads of energy in 1984, 36 percent of total U.S. consumption. During the past decade, energy consumption in the sector has remained essentially constant while occupied housing stock has increased by more than 15 percent and commercial floorspace by more than 20 percent. Although this is an impressive gain in energy end-use efficiency, numerous studies have shown that there is a significant potential for further improvements in both residential and commercial buildings. New technologies including building materials, glazings, components and subsystems integration, heating and cooling equipment, and lighting could result in new buildings that use 80 percent less energy than the present building stock. Similarly, retrofit technologies could significantly reduce the energy use of existing buildings. This potential for energy conservation gains offers the nation an important opportunity for economic growth, energy stability and security, a cleaner environment, and enhancement of the competitive position of U.S. industries in the world marketplace. Building energy conservation, therefore, plays a significant role in national energy policy, and is a critical element in a balanced and diverse energy resource system.

The mission of the Buildings and Community Systems (BCS) program is to promote energy security, strength and stability by leading a national effort to achieve the maximum, cost-effective, energy efficiency in the buildings sector. Objectives that have been established to carry out this mission are:

o Development by 2010 of advanced building energy efficiency technologies that can produce annual energy savings of 10 quads ($50 billion) per year and that enhance energy source flexibility.

o Transfer of the results of energy-efficiency R&D to the private sector for commercialization.

o Identification and reduction of impediments to the adoption of building energy-efficiency technologies.

o Implementation of DOE's Congressionally mandated regulatory responsibilities for building energy efficiency.

The strategy for achieving these objectives includes three components: research, regulatory and mandated program support, and technology transfer.

Research is conducted to advance the scientific and technical understanding of how energy is consumed in buildings and how increased energy efficiency can be achieved while maintaining healthful indoor environments. Three research subprograms are conducted: (1) Building Systems, to advance the technologies which support development of more energy-efficient building shells; (2) Technology and Consumer Products, to advance the technologies that support development of more energy-efficient heating, cooling, lighting and other building equipment; and (3) Community Systems, which has advanced the technologies that support development of cost-effective district heating and cooling and other community-based energy systems. (Scheduled for completion in FY 1987.)

Three mandated subprograms are conducted: (1) Appliance Standards, to develop and maintain test procedures for determining the energy efficiency of major home appliances and, where appropriate, to establish minimum energy-efficiency standards for these appliances; (2) Federal Energy Management Program (FEMP), to coordinate the effort to reduce energy consumption in the Federal sector by improved energy management and the use of life cycle cost techniques in retrofitting and constructing Federally owned or leased buildings; and (3) Residential Conservation Service, to coordinate a voluntary effort by major utilities to encourage energy conservation in buildings.

In addition, mandated program activities are conducted in two other subprograms. The Building Systems subprogram includes support for the development and introduction of voluntary standards for new residential and commercial buildings in the private sector and mandatory standards for new Federal buildings. The Analysis and Technology Transfer subprogram conducts a Least Cost Utility Planning activity to develop analytical tools and collect data needed by the utility industry for least-cost planning initiatives.

Technology transfer is carried out by the Analysis and Technology Transfer subprogram. It disseminates program research results to a wide range of decision makers through the use of existing public and private sector technology transfer mechanisms. This subprogram also provides the data and tools needed for program planning and evaluation.

Funding of $14,578,000 is requested for five of the above subprograms plus Program Direction and Capital Equipment. No funding is requested for the Community Systems subprogram as it is planned to end after FY 1987. Federal funding for the Residential Conservation Service was terminated after FY 1986.

Building Systems: The Building Systems subprogram supports research to advance the understanding of energy use in buildings and improve building energy use efficiency. It also implements the requirements of the Energy Conservation Standards for New Buildings Act of 1975. The subprogram consists of four key activities:

- Building subsystems research - studies the energy efficiency of roofs, and air movement and the effects of energy efficiency measures on indoor air quality.
- Building systems interactions - studies the interactions among components and how these subsystems can be integrated to produce a more energy efficient whole building.

- o Building retrofit research - focuses on the special problems associated with improving the energy performance of existing buildings.

- o Standards and guidelines - implements the statutory requirement to develop voluntary energy efficiency standards for private sector buildings and mandatory standards for Federal buildings.

FY 1988 funding of $3,600,000 is requested to continue research in roofs, indoor air quality, commercial building systems interactions, and multifamily building retrofit, and to continue development of building energy efficiency standards and guidelines.

Technology and Consumer Products: The Technology and Consumer Products subprogram is responsible for providing the technology to support development of more efficient building energy equipment. It supports research of basic phenomena and engineering concepts which provide the potential for substantially increasing the efficiency of conversion of energy in the form of oil, gas, solid fuels, and electricity into space heating and cooling, refrigeration, and lighting. This subprogram consists of four key activities: thermally activated heat pumps, advanced refrigeration technology, combustion heating systems, and advanced lighting.

FY 1988 funding of $4,400,000 is requested for this subprogram. These funds will be used to continue research on absorption technology for thermally activated heat pumps; non-azeotropic refrigerant mixtures; advanced magnetically loaded, surface wave and electrodeless high intensity discharge lamp technologies; and the effects of advanced lighting systems on human health and performance.

Analysis and Technology Transfer: The purpose of the Analysis and Technology Transfer subprogram is to analyze building industry and technology trends in order to determine BCS research priorities, to transfer the research results of BCS-sponsored projects to the end-use sectors, and to provide program planning support to all the BCS subprograms. Currently, this subprogram provides support for IEA implementing agreements, conducts technical assessments and analyses to support BCS program planning and evaluation, and carries out technology transfer initiatives.

Funding of $1,000,000 is requested for the Analysis and Technology Transfer subprogram in FY 1988. These funds will provide continued support for IEA implementing agreements, the building energy data book and the annual analysis of BCS programs; will be used to plan a survey to evaluate acceptance of building energy conserving technologies; and will support continuation of technology transfer initiatives.

Appliance Standards: The Appliance Standards subprogram develops test procedures for measuring the energy efficiency of household appliances; analyzes the need for and, if appropriate, develops appliance standards; and supports related educational programs. These subprogram activities are required by the Energy Policy and Conservation Act (EPCA), as amended. The household appliance requirements of EPCA are divided between DOE and the Federal Trade Commission (FTC). The FTC is directed to require energy efficiency labels on major household appliances. DOE is directed to define the test procedures used in developing these labels.

In FY 1987, this subprogram is performing research on the impacts of appliance standards and is processing manufacturers' requests for supervision of State standards. FY 1988 funding of $1,800,000 is requested to continue these activities and to resume developing, maintaining, and improving appliance test procedures.

Federal Energy Management Program: The Federal Energy Management Program (FEMP) was established by the Energy Policy and Conservation Act (EPCA) of 1975 and amended by the National Energy Conservation Policy Act (NEPCA) of 1978. The purpose of this Congressionally-mandated subprogram is to reduce the level of energy consumption by all branches of the Federal government. Specifically, FEMP is charged with achieving the following objectives in existing and new Federally-owned and leased buildings: reducing energy consumption; using energy more efficiently; altering fuel mix to reduce dependence on imported fuel; increasing the use of renewable energy; and transferring applicable energy management experience and technologies among Federal agencies and private sector entities.

FEMP carries out this program through two major activities: Federal Planning, Coordination, Evaluation and Reporting; and Technical Guidance and Assistance to other Federal agencies. FY 1988 funding of $1,000,000 is requested for these activities.

Residential Conservation Service: This regulatory program consisted of the Residential Conservation Service (RCS) and the Commercial and Apartment Conservation Service (CACS). The CACS portion of the program was repealed by the Conservation Service Reform Act (CSRA) of 1986 (PL 99-412). The same legislation reauthorized, with modifications, the RCS through June 30, 1989. Federal programmatic funding for both activities was terminated at the end of FY 1986 but staffing was continued in FY 1987 to manage RCS and provide assistance to utilities and related groups to encourage voluntary energy efficiency programs using non-Federal funds. No FY 1988 funding is required or requested for this subprogram. Staffing continues for RCS management and assistance to utilities and related groups on voluntary programs.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION
(dollars in thousands)

LEAD TABLE

Buildings and Community Systems

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Building Systems	$12,124	$ 8,950	$ 8,950	$ 3,600	-$ 5,350
Community Systems	3,813	2,900	2,900	0	- 2,900
Technology and Consumer Products	10,285	9,250	9,250	4,400	- 4,850
Analysis and Technology Transfer	2,594	2,000	2,000	1,000	- 1,000
Appliance Standards	1,906	2,000	2,000	1,300	- 200
Federal Energy Management Program	1,214	950	950	1,000	50
Residential Conservation Service	381	0	0	0	0
Program Direction	3,639	3,650	3,650	2,500	- 1,150
Operating Expenses	35,956	29,700	29,700	14,300	- 15,400
Capital Equipment	1,906	750	750	278	- 472
Total Buildings and Community Systems	$37,862	$30,450	$30,450	$14,578	-$15,872
Staffing Total FTE	61	71	71	45	- 26

LEAD TABLE

Buildings and Community Systems (Cont.)

Authorization:

- P.L. 93-577, as amended, Energy Research and Development Act
- P.L. 94-163, Part E (Sec. 381), Energy Policy and Conservation Act
- P.L. 94-385, Energy Conservation and Production Act
- P.L. 94-438, Energy Reorganization Act of 1974
- P.L. 95-618, (Title I), Energy Tax Act
- P.L. 95-619, (Sec. 224, Parts 1, 2, 4: Sec. 210-223; and Sec. 501, 541-551; Title II, Part I and Title VII), National Energy Conservation Policy Act
- P.L. 95-620, Power Plant and Industrial Fuel Use Act of 1978
- P.L. 96-294, Energy Security Act
- P.L. 99-412, Conservation Service Reform Act, Title I, Title II

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION
(dollars in thousands)

SUMMARY OF CHANGES

Buildings and Community Systems

FY 1987 Appropriation enacted	$ 30,450
Adjustments	0
FY 1988 Base	30,450
Building Systems	
- Building Materials	-1,050
- Building Subsystems Research	
-- wall research	- 600
-- roof research	- 200
-- fenestration research	-1,300
-- indoor air quality, infiltration and ventilation	- 400
- Building Systems Interactions Research	
-- commercial building systems interactions	- 600
-- performance calculation	- 600
- Building Energy Retrofit Research	
-- single family buildings	- 700
-- multifamily buildings	- 300
- Standards and Guidelines	+ 400
Community Systems	
- District Heating and Cooling	
-- advanced fluids	- 400
-- components research	- 283
-- advanced systems	- 217

SUMMARY OF CHANGES

Buildings and Community Systems (Cont.)

- Community Energy Systems Integration	
-- Urban Consortium	-2,000
Technology and Consumer Products	
- Thermally Activated Heat Pumps	
-- Absorption Technology	- 200
-- Stirling Engine Technology	-1,500
-- I.C. Engine Technology	-1,000
- Advanced Refrigeration System	-1,400
- Combustion Systems Research	- 650
- Lighting Equipment Research	- 340
- Lighting Impacts Research	+ 40
- Building Lighting Application Research	+ 200
Analysis and Technology Transfer	
- Least Cost Utility Planning	-1,000
Appliance Standards	
- Test Procedures and Consumer Education	- 300
- Appliance Standards Development	+ 100
Federal Energy Management Program	
- Federal Planning, Coordination, Reporting and Evaluation	- 65
- Program Technical Guidance and Assistance	+ 115
Program Direction	-1,150
Capital Equipment	- 472
FY 1988 Congressional Budget Request	$14,578

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

BUILDINGS AND COMMUNITY SYSTEMS

I. Preface: Building Systems

The objective of the Building Systems subprogram is to encourage optimal use of energy in U.S. buildings. Long-term generic research is conducted to advance the knowledge of energy transfer phenomena in buildings and the results of that research are provided to practitioners in the building industry.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Building Materials	$1,048	$1,050	$0	-100
Building Subsystems				
Wall Research	1,219	600	0	-100
Roof Research	495	600	400	-33
Fenestration Research	1,523	1,300	0	-100
Indoor Air Quality, Infiltration and Ventilation	1,809	1,900	1,500	-21
Lighting	190	0	0	0
Building Subsystems Interactions				
Commercial	952	1,000	400	-60
Residential	857	0	0	0
Performance Calculation	762	600	0	-100
Control Systems	95	0	0	0
Building Energy Retrofit Research				
Single Family Buildings	651	700	0	-100
Multifamily Buildings	680	800	500	-38
Commercial Buildings	700	0	0	0
Standards and Guidelines	1,143	400	800	100
Total, Building Systems	$12,124	$8,950	$3,600	-60

II. B. Major Laboratory and Facility Funding

Brookhaven National Laboratory	$314	$0	$0	0
Lawrence Berkeley Laboratory	$4,176	$2,695	$1,200	-55
Oak Ridge National Laboratory	$2,107	$1,307	$269	-79
Pacific Northwest Laboratory	$1,318	$921	$832	-10
Solar Energy Research Institute	$330	$260	$88	-66

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Building Systems			
Building Materials	Continue basic properties studies of insulation materials; including loose-fill studies and the aging study of foamed board materials.	Expand basic properties studies to include other building materials as well as insulation, using the ORNL flat screen tester for steady-state and dynamic measurements. Complete foamed board insulation aging study.	No Activities.
	Continue assessment of masonry block products and low-density concretes.	Complete low-density foamed cement insulation tests and insulation corrosion mechanisms study.	
	Continue tests of candidate improved standard reference materials using 1-meter Guarded Hot Plate (GHP); verify precision and accuracy of high temperature GHP.	Complete qualification of low thermal conductivity standard reference material (SRM) and begin certification of refractory fiberboard SRM.	
	Continue model development with verification through experimental testing using screen test apparatus. ORNL, NBS	Extend analytical thermal model development and verification testing to building materials other than insulation.	
		Conduct wood thermophysical properties study and radiant barrier performance and emittance test tasks. Prepare analyses of the US building materials industry, foreign building materials R&D trends and quantification of the impacts of this program's R&D results. Prepare materials chapter for 3rd edition of the National Program Plan for the Thermal Performance of Building Thermal Envelope Systems and Materials. ORNL, NBS	
	$1,048	$1,050	$0
Building Subsystems/Wall Research	Develop procedure for dynamic testing of walls in the calibrated hot box; complete static tests of composite wall sections.	Continue dynamic tests of walls at NBS; develop laboratory test procedures to evaluate dynamic performance of walls.	No Activities.

III. Building Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	Develop techniques to evaluate building envelope thermal anomalies (BETA's); complete study of low-density high-strength concrete to eliminate concrete thermal bridges. Complete construction of thermal bridge laboratory facility.	Conduct laboratory study and analyses of thermal anomalies; initiate study of building envelope joints (wall-floor, wall-wall, etc.). Continue development of thermal anomaly design guide.	
	Develop simplified methods for use of thermal mass data base in design.	Terminate thermal mass research on exterior envelopes. Provide limited technical support for ASHRAE handbook.	
	Initiate foundations/earth contact research by evaluating problems associated with crawl space moisture control. Conduct study of innovative foundation systems. Evaluate the value of a foundations test facility. Initiate development of design guide and handbook. NBS, ORNL	Develop technology for optimum integrated foundation systems addressing interaction of energy & non-energy elements (radon & moisture mitigation, etc.). Develop design guide/handbooks. NBS, ORNL	
	$1,219	$600	$0
Roof Research	Continue development of the Roof Research Center (RRC). Complete fabrication of the RRC test chamber.	Install RRC test chamber. Complete data acquisition system design and installation. Conduct acceptance tests, and begin calibration of apparatus in the RRC. Develop research plans for the RRC in cooperation with the roofing industry.	Calibrate environmental test chamber of the RRC. Continue effort to fully equip the RRC by cost-sharing with industry. Begin operation of RRC as a DOE-user facility and actively seek industry participation.
	Continue thermal and moisture testing with the Roof Thermal Research Apparatus (RTRA) in support of validation of performance model. Validate in-situ heat flow measuring devices. Complete research on impact of surface reflectance on thermal performance.	Complete analysis of one-dimensional transient thermal performance of insulated roof system. Conduct research on effects of surface mass on thermal performance. Develop thermal performance guidelines on effects of surface reflectance and surface mass. Complete report assessing thermal measurement techniques.	Continue performance study and validation of analytical results by the use of RTRA. Emphasize research directed toward solution to problems of interest to the roofing industry. Conduct generic research on roof energy efficiency and durability in cooperation with roofing industry.
	Complete development and initiate validation for moisture measuring instruments. Continue Massachusetts Institute of Technology (MIT) moisture transfer study.	Complete calibration of non-intrusive capacitance moisture probe. Complete MIT moisture transfer study. Develop prototype intrusive moisture probe.	Transfer quantitative moisture measurement technology to industry for commercial development. ORNL

III. Building Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	Continue development of START model for predicting uni-directional heat flow.	Complete development of START thermal model. Conduct limited three-dimensional thermal analysis of insulated roofing system.	
	Complete development of methodology for assessing thermal performance of low-sloped roofs.		
	Complete a study of the effect of solar ultra violet radiation on roof systems.		
	Provide a report on the accuracy of thermographic temperature measurements. ORNL		
		Participate with the IEA on low-sloped roof research and technology transfer. ORNL	
	$495	$600	$400
Fenestration Research	Continue reduced scope Mobile Window Thermal Test Facility (MoWITT) summer and winter field tests for multiglazed windows and sun control systems. Conduct limited simulation of non-residential daylighting performance. Terminate occupant impact studies. Conduct component U-value test on sealed insulating glass units; and complete shading device validation.	Conduct MoWITT tests to provide validated data base on advanced window performance and to validate simulation models to support ASHRAE handbook submissions and development of design tools.	No Activities.
	Conduct reduced level research on advanced design tool planning. Develop, jointly with industry, skylight handbook. Initiate residential handbook/guide.	Continue expansion of non-BCS support for fenestration research. Develop, jointly with industry design tools including residential and non-residential design guides and handbooks, and an advanced envelope design tool.	

III. Building Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	Test & evaluate low emissivity (low-E) coatings; Develop durable low-E coating & initiate development of advanced low-E window technology. LBL, SERI, FSEC	Complete optimization of titanium nitride durable low emissivity (low-E) coatings and transfer technology to industry. Complete data base of low-E coating properties. Continue development of very high-R window technology. LBL, SERI, FSEC ($1395 including $1300 new BA and $95 of prior year funds)	
	$1,523	$1,300	$0
Indoor Air Quality, Infiltration & Ventilation	Continue to identify and quantify sources of indoor radon, to assess the variability of ambient radon levels, and to characterize radon entry mechanisms into and behavior within buildings.	Initiate interagency effort to identify and quantify sources of indoor radon, to characterize radon entry mechanisms into and behavior within buildings, and to demonstrate energy efficient radon mitigation techniques in fourteen homes.	Continue interagency effort to identify and quantify sources of indoor radon, to assess the variability of ambient radon levels, and to characterize radon entry mechanisms into, and behavior within buildings, and to demonstrate energy efficient radon mitigation techniques, emphasizing new construction techniques.
	Continue to develop and evaluate energy efficient and cost effective source control and ventilation strategies to maintain indoor air quality, including laboratory techniques to address ventilation effectiveness.	Continue to develop and evaluate energy efficient and cost effective source control and ventilation strategies to maintain indoor air quality, including laboratory and field testing of water heater pumps for residential applications.	Continue to develop and evaluate energy efficient and cost effective source control and ventilation strategies to maintain indoor air quality, testing and evaluating displacement ventilation techniques for non-residential applications.
	Complete research to characterize volatile organic emissions from building materials, and continue research to develop and field test techniques to measure these compounds.	Complete research to develop and field test techniques to measure volatile organic compounds, and to test mitigation techniques for these pollutants.	
	Continue collaborative efforts with the private sector to maintain and expand an indoor air quality field studies data base.	Terminate collaborative efforts with the private sector to maintain and expand an indoor air quality field studies data base.	
	Initiate interagency efforts to develop and validate an indoor air quality model to simulate interzonal flows among well mixed zones.	Continue interagency efforts to develop and validate an indoor air quality model, completing interzonal flow simulation and initiating modeling of intrazonal flows.	Continue interagency efforts to develop and validate an indoor air quality model, initiating laboratory and limited field validation of the model.

III. Building Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	Continue measurement of infiltration and ventilation performance in a large building, initiating efforts to measure indoor pollutants and ventilation effectiveness.	Initiate interagency effort to measure indoor air quality, infiltration, and ventilation performance in two large buildings, performing pollutant and ventilation measurements in conjunction with an epidemiologic questionnaire.	Continue to measure indoor air quality, infiltration, and ventilation performance in two additional large buildings.
	Complete testing and evaluation of the AC pressurization technique for measuring air leakage.		
	Continue research to develop and evaluate passive and active techniques for measuring multizonal air infiltration and air leakage.	Complete development of active technique for measuring multizonal air leakage in large buildings. Test and evaluate active techniques for measuring multizonal air infiltration.	Complete testing, intercomparison, and evaluation of multi-tracer gas techniques for measuring air infiltration and air leakage, including field testing.
	Continue development and validation of a simplified multizonal infiltration and ventilation model.	Terminate development and validation of a simplified multizonal infiltration and ventilation model.	
	Initiate scale model research of forced convection flows in enclosures.	Terminate scale model research of forced convection flows in enclosures.	
	Participate in collaborative efforts to develop voluntary industry consensus standard for ventilation and indoor air quality, and continue interagency efforts to coordinate indoor air quality research.	Participate in collaborative efforts to revise voluntary industry consensus standards for ventilation and indoor air quality in response to public review, and continue interagency efforts to coordinate indoor air quality research.	Participate in collaborative efforts to issue voluntary industry consensus standards for ventilation and indoor air quality, and continue interagency efforts to coordinate indoor air quality research.
	LBL, NBS, BNL, SERI, ORNL ($1900 including $1,809 new BA and $91 of prior year funds)	LBL, NBS, BNL, SERI, ORNL	LBL, NBS, BNL, SERI, ORNL
	$1,809	$1,900	$1,500
Lighting	Complete study of lighting in 13 office buildings. Develop hypotheses about how to quantify the relationship among lighting comfort, lighting design variables, and lighting energy use. ORNL, LBL	Develop a research plan to quantify the relationships between lighting energy use, lighting comfort, and lighting design variables, using $16 of prior year funds. ORNL, LBL	No Activities.
	$190	$0	$0

III. Building Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Building Systems Interactions Commercial	Complete the characterization of multifamily high-rise energy use in the prototypes defined with industry; identify significant energy use determinants, and develop design guidance. Derive, for review, initial target for first set of building-load types. Publish agenda for long-term systems integration of advanced subsystems and design process research for consideration by private industry. PNL	Characterize the interactive effects of a typical office building space conditioning system with the building shell, and of the interactive effects of lighting and space conditioning equipment. Continue the development of building energy efficiency targets for commercial buildings in collaboration with industry. Resolve technical issues resulting from industry review of the target-setting methodology, and calibrate the model for the development of targets. Continue the development of the intelligent building design and operating technologies research plan. PNL	Continue office building subsystem interaction studies with an analysis of the energy effects of current modeling approaches that simplify or ignore interactions; initiate a study of the most significant of these using measured data, more detailed models, and laboratory tests to explain and quantify the interactions and energy effects. Continue the development of building energy design targets and of a model to produce targets for specific buildings. PNL
	$952	$1,000	$400
Residential	Publish Notice of Inquiry and review public comment on thermal mass addition to finalized slide rule and documents. Complete, test, validate, and update PEAR with thermal mass and apartment data. Collect climate data and prepare climate related rules of thumb for designers. Analyze hot-arid data to ascertain primary determinants of residential building energy use, validate finite element model. Analyze interactions of building design parameters. LBL, BNL, FSEC	Complete analysis of hot-arid data, develop guidelines and transmit to industry, using $39 of prior year funds.	No Activities.
	$857	$0	$0
Performance Calculations	Continue maintenance of DOE-2 building energy performance computer code. Continue DOE-2 documentation and user manuals efforts. Continue development, testing, and validation of new capabilities for DOE-2. Continue advanced building energy simulation research. Continue the development, testing, and validation of advanced building energy simulation	Issue an upgraded version of the DOE-2 building energy performance computer code. Make available the knowledge needed for the maintenance and upgrading by the private sector. Phase-out advanced building energy simulation research. Phase-out the development, testing, and validation of advanced building energy simulation	No Activities.

III. Building Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	modules. LBL, SERI, NBS	modules. LBL, SERI, NBS	
	$762	$600	$0
Control Systems	Phase-out all activity; specifically, terminate development of evaluating the dynamic interactions among building envelope, space conditioning and other energy-using systems and building energy control systems. NBS	No Activities.	No Activities.
	$95	$0	$0
Building Energy Retrofit Research			
Single Family Buildings	Validate the single family monitoring protocol through limited field tests, obtain consensus among private and public organizations on its application and conduct cooperative field monitoring efforts. Using field monitoring and other techniques, conduct research to determine the reasons for variations between predicted and actual energy savings of key retrofit measures and the impacts of building retrofit in hot and humid climates. Complete test and evaluations of equipment retrofit measures and programs. ORNL, SERI ($700, including $651 new BA and $49 of prior year funds)	Continue the validation of single family monitoring protocol through field monitoring of several retrofitted buildings. Monitor building envelope revisions and mechanical equipment modifications in residence located in hot humid climates, and assess the effectiveness of the measures. Study occupant behavior impacts before and after retrofit. Develop and disseminate retrofit technolgoy transfer packages summarizing results of audit field test already completed and analyzed. Continue to work with the American Society for Testing and Materials (ASTM) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) to encourage the adoption of DOE developed monitoring protocols as industry acceptable standards. Phase-out single family building energy retrofit research. ORNL, LBL, SERI	No Activities.
	$651	$700	$0
Multifamily Buildings	Validate the monitoring protocol through limited field tests, obtain consensus among private and public organizations on its application. Conduct monitoring of public housing	Continue the validation of multifamily monitoring protocol through field monitoring of several retrofitted buildings. Conduct analysis of buildings previously monitored	Validate monitoring protocols and analyze data from previous monitoring work. Pursue development and adoption of standard protocol. Support cost-shared RFP for multifamily

III. Building Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	projects and review of retrofit measures for hydronic systems. Using field monitoring and other techniques, assess the accuracy of existing audit methods for multifamily housing, determine end-uses (e.g., heating, hot water) with largest potential energy savings, and conduct research to study the impacts of occupant behavior on retrofit energy savings. Develop standard diagnostic procedures for determining air infiltration in multi-family buildings. LBL, Princeton, SERI	(including public housing). Using the results of the assessment of the accuracy of existing audit methods, develop an audit handbook for both envelope revision and mechanical equipment modification. Initiate data collection on multifamily retrofits in hot and humid climates and continue the development of standard diagnostic procedures for determining air-infiltration rates. Continue to study occupant behavior impacts before and after retrofit. Continue to work with the American Society for Testing and Materials (ASTM) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) to encourage the adoption of DOE-developed monitoring protocols as industry accepted standards. LBL, ORNL, SERI, Princeton	retrofit monitoring. Continue the development of standard diagnostic procedures for determining air infiltration in multifamily buildings. Continue to encourage ASTM and ASHRAE adoption of monitoring protocols as industry accepted standards. LBL, Princeton
	$680	$800	$500
Commercial Buildings	Complete data gathering and analysis of building types and end-uses. Develop a standard protocol for collecting and analyzing field data on the impact of retrofit measures in small commercial buildings. Conduct research to validate the monitoring protocol through limited field tests. Conduct research on management practices and decision making in the commercial sector to determine the types of retrofit stategies that might be most effective. Terminate commercial building retrofit program. ORNL, PNL, SERI	No Activities.	No Activities.
	$700	$0	$0
Standards and Guidelines	Review public comment received on commercial and Federal residential standards Notice Of Proposed Rulemakings (NOPR), make necessary revisions, and prepare and promulgate interim standards for both the	Complete development of interim voluntary residential standards; prepare Notice of Proposed Rulemaking (NOPR), environmental and economic assessments, and technical support documents. PNL, LBL	Issue interim standard for both the commercial and Federal residential standards; initiate statutorily required demonstration of both standards. Issue voluntary residential standards Notice of Proposed Rulemaking

III. Building Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	commercial and Federal residential standards. Continue development of voluntary residential standard. PNL, LBL $1,143	$400	(NOPR), review public comments, and prepare interim standard. PNL, LBL $800
Subtotal Building Systems	(TOA $12,264) BA $12,124	(TOA $9,100) BA $8,950	$3,600

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

BUILDINGS AND COMMUNITY SYSTEMS

I. Preface: Community Systems

The objective of the Community Systems program is to improve energy use at the community level through research on energy supply, use and the integration of supply and use, with emphasis on improvement of the efficiency of district heating and cooling systems and energy efficient community development.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
District Heating and Cooling				
Advanced Fluids	$367	$400	$0	-100
Components Research	340	283	0	-100
Advanced Systems	267	217	0	-100
Feasibility Assessments	720	0	0	0
Community Energy Systems Integration				
Urban Consortium	1,903	2,000	0	-100
Site Design	216	0	0	0
Total, Community Systems	$3,813	$2,900	$0	-100

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988	$ Change
Argonne National Laboratory	$549	$510	$0	-100
Brookhaven National Laboratory	$150	$300	$0	-100
Oak Ridge National Laboratory	$25	$30	$0	-100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
DHC/Advanced Fluids	Continue research on distribution fluid additives for drag reduction ("slippery water") to improve fluid flow for DHC applications, and begin assessment and testing of phase change slurries ("liquid ice") to enhance the energy	Select additives from each of three groups--polymers, surfactants and fibers --and test for friction reduction, heat transfer, corrosion and longevity. Continue assessment and testing of phase change slurries for district	No Activities.

III. Community Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	carrying capability of fluids for district cooling. ANL, BNL	cooling. Develop technologies for the production and transport of ice slurries. ANL, BNL	
	$367	$400	$0
DHC/Components	Complete methods for analyzing underground distribution systems performance. Develop an acoustic leak detection system. Complete "elbow-out-of-plane" meters installation analysis in support of industry standards development for thermal metering. Develop and test an advanced two stage ranking cycle heat pump overcoming high temperature lift. Develop and test a quasi-open cycle steam heat pump for the use of low temperature waste energy sources. Test the feasibility of converting steam radiators to hot water using sub-atmospheric conditions. Develop and test a new low cost meter for accurate real time measurement of Btu flow rate of steam and water. ($740 including $340 new BA and $400 unobligated carryover) ANL	Continue development of an acoustic leak detection system. Jointly with industry, develop and test non-metallic pipes capable of carrying fluids in the 250-350 degrees F. range. Continue developemnt and testing of small Btu meters which are low-cost and accurate, and the development and testing of advanced heat pumps for district heating and cooling applications, i.e., two-stage Rankine cycle heat pump and quasi-open cycle steam system heat pump, using $283 in new Budget Authority and $309 in unobligated carryover funds. ANL	No Activities.
	$340	$283	$0
DHC/Advanced Systems	Continue research in methods to retrofit old systems using Scranton system as a laboratory. Continued the Scranton Mine Water Heat Recovery Project. Continue systems technology analysis for various climatic regions. ($750 including $267 in new BA and $483 in unobligated carryover) ANL, BNL	Continue research in methods to retrofit old systems using Scranton as a laboratory. Continue development and testing of submerged heat pump under the Scranton Mine-Water Heat Recovery project. Complete systems technology analysis for northern climates and initiate analysis of district cooling systems including modular cogeneration system for southern climates, using $217 of new Budget Authority and $483 in unobligated carryover funds. ANL, BNL	No Activities.
	$267	$217	$0
DHC/Feasibility	Select an additional 12 communities to	No Activities.	No Activities.

III. Community Systems (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Assessments	assess the feasibility of DHC; continue technical support to participating communities. Continue dissemination of DHC research results and information exchange.		
	$720	$0	$0
Community Energy Systems Integration	Completed model development and began field testing of selected design strategies in a variety of climatic regions.	No Activities.	No Activities.
	$216	$0	$0
	Conduct 20 projects in the Urban Consortium program to improve energy efficiency in local government operations and communities.	Research efforts will focus on the development, application, and transfer of cost-effective technologies and management tools to effect energy use and management in approximately 20 cities and counties.	No Activities.
	$1,903	$2,000	$0
Subtotal Community Systems	(TOA $4,696) BA $3,813	(TOA $3,692) BA $2,900	$0

DEPARTMENT OF ENERGY
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KEY ACTIVITY SUMMARY

BUILDINGS AND COMMUNITY SYSTEMS

I. Preface: Technology and Consumer Products

The purpose of the Technology and Consumer Products subprogram is to provide the technological basis for improved, energy efficient building energy conversion processes and equipment. Research is conducted to investigate, develop, and test generic technical approaches and engineering concepts with potential for substantially increasing the efficiency with which raw energy in the form of oil, gas, solid fuels and electricity is converted into useful energy in the form of heat, refrigeration, and lighting.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Thermally Activated Heat Pumps				
Absorption Technology	$2,315	$2,500	$2,300	-8
Stirling Engine Technology	1,160	1,500	0	-100
I.C. Engine Technology	1,000	1,000	0	-100
Advanced Refrigeration Systems	2,188	1,800	400	-78
Combustion Systems Research	958	650	0	-100
Lighting Equipment Research	1,914	1,240	900	-27
Lighting Impacts Research	550	360	400	11
Building Lighting Application Research	200	200	400	100
Total, Technology and Consumer Products	$10,285	$9,250	$4,400	-52

II. B. Major Laboratory and Facility Funding

Brookhaven National Laboratory	$350	$175	$0	-100
Lawrence Berkeley Laboratory	$1,034	$1,087	$1,017	-6
Oak Ridge National Laboratory	$2,717	$2,006	$658	-67
Pacific Northwest Laboratory	$113	$160	$125	-22

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Thermally Activated Heat Pumps/ Absorption	Continue proof of-concept tests and evaluation of advanced cycle absorption heat pumps for residential and	Continue test and evaluation of advance cycle absorption heat pumps for residential and commercial	Continue test and evaluation of residential and commercial size advanced cycle absorption heat pumps

III. Technology and Consumer Products (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Technology	commercial application. Begin proof-of-concept tests on commercial systems. Initiate solution pump development for residential absorption systems. ORNL	application. Continue research and development of residential advanced cycle absorption heat pumps using ternary fluids, and continue solution pumps development. ORNL	using ternary fluids. Continue evaluation of modulating systems and control techniques. Continue absorption technology assessment and diagnostics. ORNL
	$2,315	$2,500	$2,300
Stirling Engine Technology	Complete research on first generation low loss hydraulic transmission/compressor for free piston Stirling engine heat pump. Initiate preliminary evaluation of alternate concepts. Continue supporting research in engine/compressor matching analysis, engine dynamics, and modeling for free piston Stirling engine heat pumps. ORNL	Develop advanced transmission/compressor concepts for free Piston Stirling engine driven heat pump. Continue supporting research in Stirling engine/compressor thermodynamics, and modeling. ORNL	No Activities.
	$1,160	$1,500	$0
I.C. Engine Technology	Continue evaluation of free piston internal combustion engine heat pump for commercial building application, including bellows seal concept development and evaluate applicability to residential application. Begin planning for co-funded testing of I.C. engine driven heat pump under field conditions. ORNL	Continue evaluation and testing of an I.C. engine driven heat pump under field and laboratory conditions. Continue evaluation of residential size I.C. engine heat pump. ORNL	No Activities.
	$1,000	$1,000	$0
Advanced Refrigeration Systems	Expand research effort in nonazeotropic refrigerant mixtures to include capacity modulation separation techniques, and composition control. Expand laboratory testing of advanced systems concepts in capacity modulation. Develop analytical methods and evaluate modulation options. Complete ground coupled heat exchanger testing and model development and transfer technology to private sector. Complete testing of optimized ground coupled heat pump system. Continue assessment of novel concepts for	Continue laboratory testing of nonazeotropic refrigerant mixtures and investigating advanced cycle concepts using mixtures. Continue laboratory testing of advanced system concepts in capacity modulation and evaluate modulation options. Continue assessment of novel concepts for alternative refrigeration cycles, including assessments of indirect evaporator coolers and thermoelectric cooling. ORNL, NBS	Conduct research in nonazeotropic refrigerant mixtures to include separation techniques, and composition control. ORNL, NBS

Program Activity	FY 1986	FY 1987	FY 1988
	alternative refrigeration cycles including assessment of ejector heat pump cycles and dessicant systems. Complete evaluation of microfine particle materials and evacuated insulation panels and transfer technology to private sector. Initiate scoping studies of concepts for advanced commercial building heating, ventilating and air-conditioning (HVAC) systems. ORNL, NBS		
	$2,188	$1,800	$400
Combustion Systems Research	Investigate corrosion mitigation techniques by assessing novel combustion approaches and design methodologies for metallic and nonmetallic condensing heat exchangers. Conduct assessment of advanced technology oil combustion systems. Develop and evaluate breadboard instruments for assessing field performance of wood heating systems. Complete analysis of combustion reactions and develop a chemical model for wood combustion. Investigate thermal loss mechanisms in forced-air distribution systems and evaluate the potential for diagnostic techniques. BNL, NBS	Investigate venting techniques for high efficiency oil heating systems. Initiate research to assess methods of oil combustion, control, diagnostics and energy recuperation processes to establish criteria for advanced combustion oil heating equipment systems. BNL, NBS	No Activities.
	$958	$650	$0
Lighting Equipment Research	Identify lamp characteristics for magnetically loaded (Zeeman effect) mercury isotope enriched lamp. Continue research on electrodeless fluorescent surface wave system. Conduct research to determine power scaling relationships for electrodeless high intensity discharge lamps with new gas fills. Conduct diagnostic experiments to characterize the lamp discharge phenomena. Initiate cost-shared research and development of mercury isotope separation processes,	Investigate techniques for applying magnetic field in magnetically loaded lamp. Conduct research to identify optimum configuration for surface wave lamp and initiate surface wave lamp driving concepts for system operation. Build prototype electrodeless high intensity discharge (HID) lamp and develop lamp driving sources. Continue lamp diagnostic experiments to characterize lamp discharge phenomena. Investigate techniques to increase throughput and efficiency of mercury	Investigate optimization techniques for applying a magnetic field for magnetically loaded fluorescent lamps. Identify significant performance variables of the surface wave lamp phenomena and continue evaluating lamp driving power supply concepts. Initiate advanced laser diagnostics for investigating optically thick and thin discharge plasma phenomena. Evaluate significant performance variables for the prototype electrodeless high intensity discharge (HID) lamp. LBL

III. Technology and Consumer Products (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	including continued development of photochemical process. LBL	Isotope separation process. LBL ($1,259 including $1,240 new BA and $19 unobligated carryover)	
	$1,914	$1,240	$900
Lighting Impacts Research	Continue to quantify identified human response effects of light source stimuli and fatigue effects of lighting on video display terminal (VDT) operators. Analyze visual performance models related to lighting and productivity. LBL	Continue investigation on relationship between lighting and productivity. Continue development of field methods to measure lighting effectiveness. Continue investigation of human response effects to light spectrum and brightness. LBL	Characterize pupillometry effects by light source stimuli and continue to quantify additional identified human responses to light sources. Evaluate experimental results of light source effects on video display terminal (VDT) operators and evaluate objective correlates for visual fatigue. Initiate experimental evaluation of lighting systems related to visual and task performance and productivity. LBL
	$550	$360	$400
Building Lighting Application Research	Continue research on lighting HVAC interactions. Continue experimental investigation of interactive effects of light system components. LBL, NBS	Initiate development of advanced interactive lighting designs. LBL	Continue development and characterization of advanced lighting designs using high efficiency systems components. Analyze experimental data from lighting/HVAC/ envelope interaction research (coordinated with Commercial Buildings Integration Program). LBL, NBS
	$200	$200	$400
Subtotal Technology and Consumer Products	(TOA $10,285) BA $10,285	(TOA $9,269) BA $9,250	$4,400

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KEY ACTIVITY SUMMARY

BUILDINGS AND COMMUNITY SYSTEMS

I. Preface: Analysis and Technology Transfer

The purpose of the Analysis and Technology Transfer subprogram is to ensure that research results and information on conservation in buildings are transferred to the private sector, and to conduct analysis necessary to support program planning.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Technical Assessment and Analysis				
IEA Support	$100	$100	$100	0
Building Energy Accounting	584	500	500	0
Least Cost Utility Planning	951	1,000	0	-100
Technology Transfer				
Rural Housing Amendments Act Study	333	0	0	0
Research Utilization	0	0	0	0
Technology Transfer	626	400	400	0
Total, Analysis and Technology Transfer	$2,594	$2,000	$1,000	-50

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988	$ Change
Brookhaven National Laboratory	$130	$160	$160	0
Lawrence Berkeley Laboratory	$791	$732	$400	-45
Oak Ridge National Laboratory	$220	$190	$100	-47
Pacific Northwest Laboratory	$918	$565	$240	-58
Solar Energy Research Institute	$0	$120	$100	-17

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Technical Assessment and Analysis	Continue to provide assistance to support IEA implementing agreements, transfer results to U.S. private sector, and arrange private sector participation in IEA activities.	Continue support for IEA implementing agreements. Continue studies of building conservation technologies used in developed countries and assess impact on international trade and U.S.	Continue support for IEA implementing agreements. Continue studies of building conservation technologies used in developed countries and assess impact on international trade and U.S.

III. Analysis and Technology Transfer (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	$100	technology leadership. $100	technology leadership. $100
	Continue to obtain data on energy use and effectiveness of new technologies; to maintain Building Energy Accounting Systems (BEAS), improve and maintain analytical tools, and conduct analysis of current and proposed BCS programs. Prior year funds of $161 are being used to support multiyear program planning, annual report, and summary of analysis. PNL, BNL ($745 including $584 new BA and $161 prior year funds) $584	Continue development of Building Energy Accounting System (BEAS), publish data book and annual analysis of current and proposed BCS programs. Improve and maintain analytical tools. Conduct special statistical analysis of the EIA residential survey data. PNL, BNL, LBL ($933 including $500 new BA and $433 prior year funds) $500	Maintain Building Energy Accounting Systems (BEAS), publish data book and annual analysis of current and proposed BCS programs, conduct strategy analysis. Design and plan survey to evaluate acceptance and success of buildings energy conserving technologies and practices. PNL, BNL $500
Least-Cost Utility Planning	Initiate research activities in areas of Technology Assessment, Market Penetration, Integrated Utility Analysis and Technology Transfer in cooperation with key elements of the utility industry including the Electric Power Research Institute (EPRI), Edision Electric Institute (EEI), National Association of Regulatory Commissioners (NARUC), American Public Power Association (APPA), Lawrence Berkeley Laboratory, Pacific Northwest Laboratory, and TBD. $951	Continue and conclude research activities in Technology Assessment, Market Penetration, Integrated Utility Analysis and transfer the results to the utility industry in cooperation with EPRI, EEI, NARUC, APPA, DOE National Laboratories and others. ($1,500 including $1,000 new BA and $500 prior year funds) $1,000	No Activities. $0
Technology Transfer	Initiate and complete RHA study comparing contruction costs, energy use and value of energy saved in homes built to national manufactured housing safety standards with homes eligible for loans or insurance under HUD's Title I and Title II programs and FmHA's Title V program. PNL $333	No Activities. $0	No Activities. $0

III. Analysis and Technology Transfer (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	Continue the Institute for Architectural and Engineering facilities and the Architectural Student Design Competition.	No Activities. $0	No Activities. $0
	Continue development of design tools, techniques and specific informational packages for architects, engineers, builders, owners, manufacturers, and professional school faculties.	No Activities. $0	No Activities. $0
	Continue to monitor research results and disseminate to States, communities, other agencies, utilities, and the private sector; and to work with associations and other organizations to sponsor workshops, conferences symposia, and committees to effectively and quickly transfer BCS research results. ORNL, SERI, PNL $626	Improve technology transfer system to monitor research progress and ensure that research results are transferred quickly, efficiently and effectively to the private sector. Continue to work with other organizations and associations to sponsor workshops, symposia, conferences, and committees to quickly and effectively transfer BCS research results. Continue the preparation and publication of state-of-the-art reports on all aspects of efficient use of energy in buildings, building equipment, and community systems. ORNL, SERI, PNL. ($490 including $400 new BA and $90 prior year funds) $400	Improve technology transfer system to monitor research progress and ensure that research results are transferred quickly, efficiently, and effectively to the private sector. Continue to work with other organizations and associations to sponsor workshops, symposia, conferences, and committees to quickly and effectively transfer BCS research results. Continue the preparation and publications of state-of-the-art reports on selected aspects of efficient use of energy in buildings, building equipment, and community systems. $400
Subtotal Analysis and Technology	(TOA $2,755) BA $2,594	(TOA $3,023) BA $2,000	$1,000

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KEY ACTIVITY SUMMARY

BUILDINGS AND COMMUNITY SYSTEMS

I. Preface: Appliance Standards

The purpose of the Appliance Standards activity is to conduct the analysis and regulatory activities necessary to comply with the Energy Policy and Conservation Act (EPCA), as amended. In 1987, the Department will conduct research and analysis on the impacts of appliance standards including a reevaluation of those previously issued. This reevaluation is required by a U.S. Court of Appeals decision and by section 325 of EPCA which specifies that it be completed during FY 1988.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Test Procedures and Consumer Education	$833	$800	$500	-38
Appliance Standards Development	1,073	1,200	1,300	8
Total, Appliance Standards	$1,906	$2,000	$1,800	-10

II. B. Major Laboratory and Facility Funding

Lawrence Berkeley Laboratory	$1,116	$1,080	$1,235	14

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Test Procedures and Consumer Education	Continue to develop, maintain, simplify and improve test procedures for appliances in support of the FTC labeling program; and to process manufacturer requests for modification of test procedures. NBS	Continue to develop, maintain, simplify and improve test procedures for appliances in support of the FTC labeling program; and to process manufacturer requests for modification of test procedures. NBS	Continue research to develop, maintain, simplify and improve test procedures for appliances (furnaces, and central air conditioners) in support of the FTC labeling program; and to process manufacturer request for modification of test procedures. NBS

III. Appliance Standards (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	$833	$800	$500
Appliance Standards Development	Continue to perform research on impacts of appliance standards (including energy use analysis); and to process manufacturer request for supersession of State standards. LBL	Continue to perform research on impacts of appliance standards (including energy use analysis); and to process manufacturer request for supersession of State standards. LBL	Continue to perform research on impacts of appliance standards (including publishing a notice of proposed rulemaking for 13 types of appliances and analysis of comments). Continue to process manufacturer requests for supersession of State standards. LBL
	$1,073	$1,200	$1,300
	(TOA $1,906)	(TOA $2,000)	
Subtotal Appliance Standards	BA $1,906	BA $2,000	$1,800

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KEY ACTIVITY SUMMARY

BUILDINGS AND COMMUNITY SYSTEMS

I. Preface: Federal Energy Management Programs

The Federal Energy Management (FEMP) program is a Federally directed effort to reduce energy use by Federal agencies, improve utilization efficiency, conserve scarce fuel, and transfer energy management experience among Federal agencies, IEA member nations, State and local governments, and private sector.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Federal Planning, Coordination, Reporting and Evaluation	$264	$365	$300	-18
Program Technical Guidance and Assistance	950	585	700	20
Total, Federal Energy Management Program	$1,214	$950	$1,000	5

II. B. Major Laboratory and Facility Funding

Pacific Northwest Laboratory....................................	$263	$295	$300	2
Oak Ridge National Laboratory...................................	$30	$0	$0	0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Federal Planning, Coordination, Reporting and Evaluation	Continue to prepare annual reports to the President and to Congress on the status of Federal agencies' progress in meeting the mandated goals of EPCA, NECPA, and E.O. 12003. Monitor agencies' energy usage and evaluate their progress in meeting mandated goals. Analyze agency energy consumption data and develop trend line	Continue to prepare annual reports to the President and to Congress on the status of the Federal agencies' progress in meeting the mandated goals of EPCA, NECPA and E.O. 12003; monitor agencies' energy consumption data; and develop trend line data for use by top management. Review energy programs and evaluate effectiveness of	Continue to prepare annual reports to the President and to Congress on the status of the Federal agencies' progress in meeting mandated goals of EPCA, NECPA and E.O. 12003; monitor agencies' energy consumption data; provide trend line data for use by management. Continue to evaluate effectiveness of shared-savings

III. Federal Energy Management Program (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	data for use by top management. Review energy programs and projects at operational sites. Prepare plans to broaden the data base of the shared-savings information center as Federal agencies put shared-savings contracts in place.	shared-savings contracts. Evaluate data developed from pilot shared-savings projects to determine effectiveness. Conduct a test of R&D coordination with DOD in energy conservation planning efforts. Review and update the FEMP energy information system to include process energy.	contracts and evaluate data developed from pilot shared-savings projects to determine effectiveness.
	Continue to coordinate agencies' activities through meetings of energy coordinators and periodic meetings of the "656" Committee. Administer the Federal Energy Efficiency Awards program and coordinate Federal agencies' participation in Energy Awareness Week.	Continue to coordinate agencies' activities through meetings of energy coordinators and periodic meetings of the "656" Committee. Administer the Federal Energy Efficiency Awards program. PNL ($396 including $365 new BA and $31 unobligated carryover)	Continue to coordinate agencies activities through meetings of energy coordinators and periodic meetings of the "656" Committee. Administer the Federal Energy Efficiency Awards program and coordinate Federal agencies' participation in Energy Awareness Week.
	$264	$365	$300
Program Technical Guidance and Assistance	Continue to update the life cycle cost (LCC) factors, and provide changes to the manual. Provide Federal agencies computer program software for conducting LCC and analyses of retrofit project. Continue assistance to agencies in implementing shared-savings projects and validate data developed on shared-savings projects. Hold special training sessions for Federal procurement officials and legal advisors on shared- savings contracting. Continue workshop on LCC analyses, "Energy in Design," and employee awareness. Hold workshops for implementing the mandatory energy conservation standards for new buildings. Develop and test an employee awareness program. Complete and distribute the "Manual for Retrofit of Existing Buildings."	Continue to update the life cycle cost (LCC) factors and provide changes to the manual. Broaden assistance to Federal agencies in developing and implementing shared-savings contracts. Continue workshops for LCC analyses, A-SEAM 2, and mandatory building standards, and hold special training sessions for Federal procurement officials and legal advisors on shared-savings contracting. Complete and distribute A/E Guide for Retrofit of Existing Buildings. PNL	Continue to update the life cycle cost (LCC) factors and provide changes to the manual. Continue assistance to Federal agencies in implementing shared-savings projects. Continue workshops for LCC analyses, "Energy in Design," employee awareness,and mandatory building standards. Continue information exchange with energy management departments of IEA governments.
	$950	$585	$700

III. Federal Energy Management Program (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Subtotal Federal Energy Management Program	(TOA $1,214) BA $1,214	(TOA $981) BA $950	$1,000

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KEY ACTIVITY SUMMARY

BUILDINGS AND COMMUNITY SYSTEMS

I. Preface: Residential and Commercial Conservation Service

The Residential Conservation Service (RCS) and the Commercial and Apartment Conservation Service (CACS) were established by Congress to provide energy audits and related services to owners of residential and small commercial buildings. The CACS program was repealed by the Conservation Service Reform Act (CSRA) of 1986; the CSRA also extended the RCS, with modifications, through June 30, 1989. DOE is undertaking activities to manage the revised RCS program and to encourage voluntary energy efficiency activities on the part of utilities and related groups.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, Residential and Commercial Conservation Service	$381	$0	$0	0

II. B. Major Laboratory and Facility Funding

Non-Applicable.

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Residential and Commercial Conservation	Completed evaluation of RCS program and shared results with States, utilities, and other interested parties. Monitor utility supply, installation, and financing programs. Continued to review CACS plans and amendments and implemented CACS Federal standby program until CACS was repealed. Responded to technical inquiries and	Terminate Federal programmatic funding for RCS and CACS programs. Continue staff management of RCS and staff assistance to utilities and related groups to encourage voluntary energy efficiency programs using non-Federal funds.	Continue staff management of RCS and staff assistance to utilities and related groups to encourage voluntary energy efficiency programs using non-Federal funds.

III. Residential and Commercial Conservation (Cont'd)

Program Activity	FY 1986		FY 1987		FY 1988
	provided policy and program guidance to CACS standby utilities. Continued limited work with utilities and others to encourage voluntary energy efficiency programs. ($624 including $381 BA and $243 unobligated carryover)	$381		$0	$0
Subtotal Residential and Commercial Conservation	(TOA $624)	BA $381	(TOA $0)	BA $0	$0

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KEY ACTIVITY SUMMARY

BUILDINGS AND COMMUNITY SYSTEMS

I. Preface: Program Direction

The requested funding will provide salaries, benefits and travel for a staff of 45 FTEs to manage the Buildings and Community Systems program.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, BCS Program Direction	$3,639	$3,650	$2,500	-32

II. B. Major Laboratory and Facility Funding

Non-Applicable.

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Program Direction	Continue staffing at the level of 61 FTEs. Provide salaries, benefits, travel, and contractor support to manage BCS programs.	Provide salaries, benefits, travel and support for 71 FTEs to manage BCS programs.	Provide salaries benefits, travel and support for a staff of 45 FTEs to manage BCS programs.
	$3,639	$3,650	$2,500
	(TOA $3,639)	(TOA $3,650)	
	BA	BA	
Subtotal Program Direction	$3,639	$3,650	$2,500

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KEY ACTIVITY SUMMARY

BUILDINGS AND COMMUNITY SYSTEMS

I. **Preface: Capital Equipment**

The purpose of the Capital Equipment subprogram is to provide items of laboratory and test equipment needed to support all Buildings and Community Systems subprograms. These items are required to carry out planned research activities at participating national laboratories and universities.

II. A. **Summary Table**

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, Capital Equipment	$1,906	$750	$278	-63
II. B. Major Laboratory and Facility Funding				
Argonne National Laboratory	$80	$89	$0	-100
Lawrence Berkeley Laboratory	$519	$425	$128	-70
Oak Ridge National Laboratory	$1,175	$150	$150	0
Solar Energy Research Institute	$24	$0	$0	0

III. **Activity Descriptions**

Program Activity	FY 1986	FY 1987	FY 1988
Capital Equipment	Acquire diagnostic, computer data logging, and laboratory test equipment to support indoor air quality, advanced lighting, heat pump, district heating and cooling, FEMP, and building systems programs. ($1,951 including $1,906 BA and $45 prior year funds)	Acquire laboratory equipment to support high intensity discharge surface wave and related light sources research, research on advanced fluids for district heating and cooling systems, and building foundations research. Acquire field test equipment for monitoring single family retrofit performance. ($755 including $750 new BA and $5 prior year funds) LBL, ANL, ORNL	Acquire data collection equipment to support building energy retrofit field testing, and laboratory equipment to support indoor air quality research. ORNL, LBL
	$1,906	$750	$278

III. Capital Equipment (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Subtotal Capital Equipment	(TOA $1,951) BA $1,906	(TOA $755) BA $750	$278
Total Buildings and Community Systems	(TOA $39,334) BA $37,862	(TOA $32,365) BA $30,450	$14,578

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OBJECT CLASS

Buildings & Community Systems

Direct Funding:	FY1986 Actual	FY1987 Estimates	FY1988 Estimates
11.0 Personnel Compensation:			
11.1 Full-time permament	$3,007	$3,056	$1,961
11.3 Other than full-time Permanent	0	0	0
11.5 Other Personnel Compensation	150	153	98
11.9 Total Personnel Compensation	3,157	3,209	2,059
12.1 Personnel benefits	331	336	216
13.0 Benefits for furmer personnel	0	0	0
21.0 Travel and Transportation of Persons	69	91	216
25.0 Other Services	32,399	26,064	11,809
31.0 Capital Equipment	1,906	750	278
32.0 Lands and Structures	0	0	0
41.0 Grants, subsidies, and contributions	0	0	0
Totals	$37,862	$30,450	$14,578

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ENERGY CONSERVATION

OVERVIEW

Industrial Energy Conservation

The Office of Industrial Programs (IP) contributes to the Department of Energy objectives of energy stability, energy security, and energy strength by conducting conservation research and development activities that improve energy use efficiency and provide for fuel flexibility within U.S. industry. The industrial sector consumes 39 percent of U.S. energy. Simply stated, the objectives of the Industrial Programs, as a subset of the DOE objectives, are to (1) improve the energy efficiency of industrial processes and energy conversion equipment; (2) expand the energy options for industrial processes by developing technologies that use all types of fuels; and (3) ensure that developed technologies conform to safety, health, and environmental requirements. Other DOE goal-related R&D objectives pursued by the Office of Industrial Programs are (1) to advance U.S. technological leadership through scientific and technical knowledge; (2) to improve the U.S. competitive position by emphasizing cooperative efforts between Government research and industrial and academic research; and (3) to facilitate the effective transfer of technology information by making the results of R&D available widely and promptly in the marketplace.

The basic strategy of the Office to accomplish these objectives is to identify, with private industry, the technological needs for achieving energy conservation in the industrial sector; identify what private industry is doing or will not do alone; select the highest priority targets not being pursued by the private sector; negotiate cost-shared contracts with private industry or contract with universities or government laboratories to carry out the federal research and development activity to the point where the new technology has been proven to work; and disseminate the "proof" to the private sector end-users.

In recent years, many of the largest U.S. industries have had to vie in both domestic and foreign markets with aggressive international competitors offering better and cheaper products while maintaining a productivity edge leading to a worsening U.S. trade position. One important factor is the Nation's comparatively inefficient use of energy. Although the difference in energy intensiveness might be attributable in part to differences in industrial structure or climate, it has been shown that many U.S. energy-intensive industrial processes have significantly lower energy efficiencies than do their counterparts in other countries. It is a goal of the Office to assist in making U.S. industry more competitive with foreign manufacturers.

Although many of the technology areas supported by the program relate to a number of industry groups, the emphasis of the program has been directed toward those activities that the private sector recommends and that offer the greatest payback. The program is divided into the following four subprograms:

Waste Energy Reduction: This subprogram supports research and development of energy-efficient technologies to recover energy contained in industrial waste streams and waste materials, and to more efficiently utilize the energy content in fuels. These efforts are applicable across a wide spectrum of industries, being directed toward waste heat recovery; combustion efficiency; industrial waste materials utilization for recycling, feedstocks, and alternative fuels; and total program support and analysis.

Work will continue on oxygen enriched air combustors; new heat pump concepts such as chemical absorption systems and an advanced magnetic heat pump; ceramic heat exchangers that are shock and corrosive resistant; and development of broad application waste conversion technologies such as liquid wastes for conversion to methane, and use of solid wastes as feedstocks. This subprogram also includes national laboratory and analytical support for the total program.

Industrial Cogeneration: This subprogram supports comprehensive research, development, and testing efforts on new cogeneration technologies which focus on advanced multi-fueled, high electrical-to-thermal ratio prime movers, low-voltage direct current energy conversion devices, characterization of organic Rankine cycle working fluids, and bottoming cycle component development and evaluation.

Evaluation of improved thermionic diodes will continue along with advanced research on the sodium heat engine, high performance steam systems and coal/water slurry-fired diesel systems.

Industrial Process Efficiency: This subprogram supports research and development of technologies to improve energy efficiency and productivity in the most energy-intensive industrial sectors of the U.S. economy. Research activities are carried out in various generic clusters, including: process electrolysis, materials processing, sensors and control systems, coatings and separations.

Promising new electrode materials have been developed under DOE contracts with private-sector research groups. Work will continue on materials development and testing, on techniques for attaching these materials, and on investigation of cell design to utilize these new materials while minimizing electrical losses. Research will continue on advanced, high-risk technologies for thin section casting of steel, carbothermic reduction of iron ore and metal separation techniques. Development work will continue on sensors with applications in the aluminum, paper, steel and other industries. Work will continue on separations research including membrane development, black liquor research and advanced drying technology for food processing applications.

Implementation and Deployment: This subprogram transfers advanced energy-efficient industrial technologies resulting from completed and ongoing research and development, and other information, to the private sector. A major element of any research and development program is the rapid dissemination of results to users, in this case to the appropriate industries. A coordinated management system is used to monitor the programs on a regular basis to ensure that R&D results are quickly transmitted. The transfer of this new knowledge is accomplished through several information transfer activities, including publications, technical meetings, workshops and symposia.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION
(dollars in thousands)

LEAD TABLE

Industrial Energy Conservation

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Waste Energy Reduction					
Operating Expenses	$11,432	$12,256	$12,256	$ 7,821	-$ 4,435
Capital Equipment	0	0	0	0	0
Subtotal Waste Energy Reduction	11,432	12,256[1/]	12,256	7,821	- 4,435
Industrial Process Efficiency					
Operating Expenses	20,003	13,300	13,300	4,600	- 8,700
Capital Equipment	0	0	0	0	0
Subtotal Industrial Process Efficiency	20,003	13,300[2/]	13,300	4,600	- 8,700
Industrial Cogeneration					
Operating Expenses	4,478	5,000	5,000	1,500	- 3,500
Capital Equipment	0	0	0	0	0
Subtotal Industrial Cogeneration	4,478	5,000	5,000	1,500	- 3,500
Implementation and Deployment					
Operating Expenses	2,732	2,400	2,400	500	- 1,900
Capital Equipment	0	0	0	0	0
Subtotal Implementation and Development	2,732	2,400	2,400	500	- 1,900

LEAD TABLE

Industrial Energy Conservation (Cont.)

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Program Direction					
Operating Expenses	2,063	2,070	2,070	1,614	- 456
Capital Equipment	0	0	0	0	0
Subtotal Program Direction	2,063	2,070	2,070	1,614	- 456
Operating Expenses	40,708	35,026	35,026	16,035	- 18,991
Capital Equipment	0	0	0	0	0
Total Industrial Energy Conservation	$40,708	$35,026	$35,026	$16,035	-$18,991
Staffing					
Total FTE	27	35	35	26	- 9

1/ Includes a pending rescission of $2,100,000.
2/ Includes a pending rescission of $2,400,000.

Authorization:
- o P.L. 93-572, "Federal Non-Nuclear Energy Research and Development Act of 1974."
- o P.L. 93-438, "Energy Reorganization Act"
- o P.L. 95-91, "Department of Energy Reorganization Act"

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION
(dollars in thousands)

SUMMARY OF CHANGES

Industrial Energy Conservation

FY 1987 Appropriation enacted	$35,026
Adjustments	0
FY 1988 Base	35,026
Waste Energy Reduction	
- Decreased Combustion Efficiency	- 500
- Decreased Recuperator Research	- 905
- Decreased Liquid/Solid Waste Conversion	- 560
- National Laboratory Support	-1,870
- Decreased Heat Pump Research	- 600
Industrial Process Efficiency	
- Reduced Process Electrolysis Research	- 500
- Reduced Materials Processing Research	-5,900
- Decreased Separations Research	-1,100
- Decreased Sensors Research	- 700
- Decreased Coatings Research	- 500
Industrial Cogeneration	
- Decreased Topping Cycle Research	-2,700
- Decreased Direct Conversion	- 300
- Decreased Bottoming Cycle	- 500

SUMMARY OF CHANGES

Industrial Energy Conservation (Cont.)

Implementation and Deployment	
- Deleted Energy Analysis and Diagnostic Centers	-1,400
- Decreased Technology Transfer	- 500
Program Direction (less 9 positions)	- 456
FY 1988 Congressional Budget Request	$16,035

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

INDUSTRIAL ENERGY CONSERVATION

I. Preface: Waste Energy Reduction

The objective of the Waste Energy Reduction subprogram is to conduct research and to develop energy efficient technologies to recover energy contained in industrial waste streams and waste materials, and to more efficiently utilize the energy content of fuels. The research is addressed within three subprograms: improved combustion efficiency, waste heat recovery and industrial waste utilization.

- Combustion Efficiency: Combustion efficiencies range up to about 80 percent depending on process and system design and there is a need for technology to further improve the efficiency of fuel conversion to thermal energy and particularly the heat transfer to the product. In addition, there is need for improved combustors to provide flexibility of fuel choice in the industrial sectors while meeting environmental requirements of furnaces, boilers, and process heaters.

- Waste Heat Recovery: This activity area is intended to establish a strong technology base to address current deficiencies which prohibit timely development of ceramic heat recuperators and heat pump technology for a wide range of industrial waste heat sources. Current heat recuperator technology cannot be effectively applied without severe degradation in performance or high cost penalties to an estimated 2 quads of thermal energy wasted with corrosive and potentially fouling high temperature exhaust systems. High temperature waste stream data is needed to solve problems and limitations of present heat exchanger technology. Similarly, development of new heat pump technology is needed to allow upgrading of an estimated 3.5 quads of process liquid and gas waste heat to a more useful process temperature level.

- Industial Waste Utilization: A variety of solid and fluid waste materials presenting serious environment problems for industry could be economically recycled or converted into useful fuels or energy-intensive products, if suitable specialized technology existed. Innovative mechanical, biochemical and thermo-chemical processes for converting solid and liquid wastes into fuels and feedstocks, and for recovering and recycling organics, inorganics, fibers, used oils, and metals, are needed to foster the development of substantial new private industrial activity in this area.

- General national laboratory management support and support services analysis for all of the industrial energy conservation program is included in this sub-program. Major project management support is included within the project funding in the appropriate sub-program. This is a departure from the practice of previous years when general and project support funding for the total program was reflected in this sub-program.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Improved Combustion Efficiency	$1,100	$1,300	$800	-38
Advanced High Temperature Industrial Heat Pumps	1,765	1,600	1,000	-38
Advanced High Temperature Recuperators	2,975	2,400	1,495	-38
Liquid Gaseous/Solid Waste Conversion	1,200	1,400	1,340	-4

II. A. Summary Table (Cont'd)

	FY 1986	FY 1987	FY 1988	$Change
Utilization of Waste Stack Gas	558	1,000	500	-50
National Laboratory and Analytical Support	3,834	4,556 *	2,686	-41
Total Waste Energy Reduction	$11,432	$12,256	$7,821	-36

* $2,100 of this amount is being proposed for rescission.

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988	$Change
Argonne National Laboratory	$945	$1,230	$500	-59
Idaho National Laboratory	$3,531	$3,618	$1,836	-49
Oak Ridge National Laboratory	$1,200	$1,200	$150	-88
Pacific Northwest Laboratory	$0	$500	$0	-100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Waste Energy Reduction			
Improved Combustion Efficiency	Continue research in oxygen enriched air and high temperature combustion air. Perform laboratory studies of selected burners with oxygen enriched combustion systems. Conduct concept/feasibility studies on selected techniques for burner controls and instrumentation. AIG Tech., Union Carbide	Continue development of oxygen enriched combustion for process furnaces. Continue laboratory development for furnace combustion controls, and fouling prevention. Reinitiate project with fossil energy for development of novel coal combustors for industrial furnaces, boilers, and process heaters. These activities utilize $300 of FY 1986 funds as well as $1300 of new budget authority. Union Carbide	Continue development tests on high temperature preheated oxygen enriched combustion air. Novel coal combustor development will be by Fossil Energy only. Union Carbide
	$1,100	$1,300	$800
Advanced High Temperature Industrial Heat Pumps	Continue evaluation of heat pump systems including a magnetic system and laboratory testing of engineering components. Conduct detail design studies of the most promising heat pump systems, including a reappraisal of	Continue heat pump development. Build laboratory breadboard components for heat of reaction systems and test to verify analytical predictions. Using network analysis results, evaluate chemical heat pump systems for best	As a continuation of the network analysis and laboratory tests, initiate configuration development for a sub-scale laboratory chemical heat pump test unit. Continue laboratory development of the advanced concept for

III. Waste Energy Reduction (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	performance and economics. Conduct an assessment of "pinch" network analysis and its application to process industries to locate points of integration of heat pumps into the process cycles. ORNL, INEL, IES	match of heat pump characteristics and process requirements. Select suitable processes and heat pump types for detail system studies. Initiate the design and fabrication of advanced components for laboratory evaluation. ORNL, INEL	a magnetic heat pump. ORNL, INEL
	$1,765	$1,600	$1,000
Advanced High Temperature Recuperators	Continue development of only the most promising non-destructive test methods and service life prediction methods for ceramic heat exchanger components operating in severe environments. Develop waste stream characterization methods for high temperature dirty waste streams and conduct preliminary characterization of a selected stream. Initiate design of selected advanced heat exchanger modules for operation in corrosive, high temperature waste streams. Continue development of technology to produce low cost ceramic powders and fabricate complex ceramic heat exchanger shapes. Complete testing and evaluation of fluid bed ceramic distributor test plates in severe environments. B&W, INEL, JPL, ORNL, TECO, AEROJET	Complete development of non-destructive flaw detection techniques. Subject known flawed samples to laboratory thermal environments to generate lifetime prediction techniques. Continue development of composite ceramic materials for high temperature heat exchanger applications and new methods of component manufacture (woven/cvd coated and gel casting). Continue test activity on large scale fluid bed ceramic distributor systems. Evaluate other novel heat exchanger technologies with application to industrial processes. B&W, INEL, ORNL, TECO, AEROJET	Continue with development of monolithic and composite ceramic heat exchangers. Initiate preliminary design evaluation for use in high pressure power systems. Continue laboratory development of waste stream diagnostic instrumentation for determining heat transfer degradation. Initiate a study on enhanced heat transfer for heat exchanger surfaces and conduct laboratory tests on new configurations. B&W, TECO, TBD
	$2,975	$2,400	$1,495
Liquid/Solid Waste Conversion	Continue high rate reactor tests on industry supplied low solids content liquid waste materials. Investigate plasma pyrolysis of high solids content industrial liquid waste materials. Continue biostrain enhancement activity to improve conversion of waste to fuel. Complete the in-forest residue wood dryer development and test at a participating site. AHL, Purdue Univ., Gorham Int'l.	Continue high rate reactor tests with enhanced biostrains on paper mill wastes to produce methane for fuel use. Examine use of membranes for separations of high oil or organic content waste streams and economics of separation. Continue research to utilize solid wastes from asphalt roofing, tires, auto shredder and textile operations as fuels and industrial product feeds. Continue development of lignin derived adhesives for wood product applications as a substitute for petroleum derived	Continue high rate anaerobic reactor tests on paper mill wastes and industry supplied liquid wastes for conversion to methane. Continue development of enhanced biota for improved degradation of wastes and conversion efficiency. Solicit proposals to characterize metal contaminents in scrap steel and develop processing techniques for their removal. Continue research into use of solid wastes products such as: carbon black from tires, molded products from synthetic textile wastes and plastic wastes. Continue development of lignin

III. Waste Energy Reduction (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
		adhesives. ANL, Manville, Ener-Group N.C. State Univ., SERI, Purdue, TBD	derived adhesives from waste wood. ANL, N.C. State, Purdue, SERI, TBD
	$1,200	$1,400	$1,340
Utilization of Waste Gases	Continue CO2 development and analyze potential for cost-shared field tests. Conduct engineering and systems studies to locate potential CO2 generation sites and use points for CO2. Start 6 MM Btu combustion tests. These activities utilize $19 of FY 1935 funds as well as $558 of new budget authority. ANL	Complete testing and evaluation of CO2-O2 enriched combustion in a 6 MM Btu furnace to ascertain cold wall radiant effect and tube deposition effects. Evaluate other waste gases for potential energy conservation based on a NOPI solicitation and initiate feasibility studies of selected areas. ANL, Energy and Environmental Research	Continue evaluation of selected gaseous wastes. Award several contracts to pursue laboratory development and assessment of economics. ANL, Dupont
	$556	$1,000	$500
National Laboratory & Analytical Support	Full project management support at National Laboratories and support services contractors. INEL, PNL, ANL, Mueller, Energetics, Hagler-Bailly, SMC	Project management support at National Laboratories and support services contractors. These activities utilize $123 of FY 1986 funds as well as $4,556 of new budget authority. INEL, PNL, ANL, Energetics	Project management support at National Laboratory and support services contractor. INEL, PNL, ANL, Energetics
	$3,834	$4,556 *	$2,686
		* $2,100 is proposed for rescission	
	(TOA $11,451)	(TOA $12,679)	
Subtotal Waste Energy Reduction	BA $11,432	BA $12,256	$7,821

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

INDUSTRIAL ENERGY CONSERVATION

I. Preface: Industrial Process Efficiency

The Industrial Process Efficiency subprogram supports research and development of technologies to improve energy efficiency and productivity in the most energy-intensive industrial sectors of the U.S. economy. Its purpose is to reduce the technical and/or economic risks which prevent industry from investing in more efficient processes and technologies. Research activities, generally cost-shared, are pursued within generic areas, including process electrolysis, materials processing, sensors and control systems, coatings and separations.

o Process Electrolysis

Products such as aluminum, magnesium, chromium, manganese and chlorine are manufactured using energy-intensive electrolytic reduction processes. Electrolysis requires more than 1.1 quads of energy annually to reduce alumina and magnesium and to produce chlorine, with energy use efficiencies typically less than 50 percent. The potential exists to significantly improve the efficiency of electrolytic reduction processes through improved anode and cathode materials and configurations.

o Materials Processing

Work in this activity area supports development of technologies for reducing energy consumption and increasing productivity in the processing of major basic products and materials, with current emphasis on steel. A major change in steel processing is being investigated through programs aimed at direct casting of thin steel sections. The potential energy savings associated with direct casting is 0.20 quad per year.

Research on direct carbothermic reduction of alumina is also included in this area.

o Sensors and Controls

Energy and process efficiency are greatly enhanced through the use of automatic process control systems. The petroleum refining and petrochemicals industries which operate multi-process integrated plants were early practitioners of integrated automatic control. As the pulp and paper, steel, food processing, textile finishing and other industries move toward automatic process control, they have found the lack of accurate, on-line sensors to measure process parameters to be a serious hindrance. A major limitation is the lack of sensors which will operate in the environmental extremes of many industrial processes. In cooperation with industry, DOE has initiated programs designed to meet some of the needs for sensors.

o Coatings

Elimination of wear and corrosion, decoration and the need to impart particular properties to surfaces, such as in printing and dyeing paper, textiles, metals and plastic surfaces, have led to development of many coating types and techniques. The majority of these techniques require the coating material to be dissolved or suspended in a liquid for application to the surface. The liquid is then removed, usually by inefficient thermal drying. Not only is the energy efficiency low, in the range of 15 to 20 percent, but often pollution abatement measures add to the cost. Development of alternative means of applying coatings, that eliminate the use of liquids, promise to significantly improve energy use. Alternative approaches are under development with DOE support.

I. Preface: Industrial Process Efficiency (Cont'd)

- Separations Systems

A critical and energy-intensive step in many industrial processes is the separation/concentration of the components of a solution or mixture. These unit operations are often the most energy-consuming at any manufacturing site and typically are accomplished through thermal evaporation, distillation or drying.

Estimates place annual industrial energy consumption for evaporation and distillation alone at 2.6 quads. Alternative technologies which can be used to perform the required operations are intrinsically less energy-intensive. Such methods include membrane separations; liquid chromotography; advanced drying concepts and others. Engineering development and process research work are required to apply these energy-conserving technologies to a multitude of industrial process streams.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Process Electrolysis	$1,500	$1,000	$500	-50
Materials Processing	14,151	6,800 *	900	-87
Sensors and Controls	2,000	2,000	1,300	-35
Separations Research	1,952	3,000	1,900	-37
Coatings	400	500	0	-100
Total, Industrial Process Efficiency	$20,003	$13,300	$4,600	-65

* $2,400 of this amount is being proposed for rescission.

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988	% Change
Argonne National Laboratory	$5,700	$235	$0	-100
Idaho National Engineering Laboratory	$340	$0	$100	0
Oak Ridge National Laboratory	$150	$100	$0	-100
Pacific Northwest Laboratory	$1,700	$1,025	$500	-51

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Industrial Process Efficiency			
Process Electrolysis	Small cell (15 amp) testing and characterization of potential inert anode materials continued. Statistical experiments determined feasible operating range and optimum conditions - e.g. temperature, alumina	Run longer term, e.g., 300 hours, bench cell (60 amp) tests to improve information base on optimum cell conditions for nickel ferrite anodes. Test other candidate materials. Determine fabrication parameters for	

III. Industrial Process Efficiency (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	concentration, current density- for nickel ferrite materials. Research on bonding of titanium diboride coatings onto cathode substrate materials continued. Investigation of the failure mechanism of titanium diboride containing materials continued. PNL, MIT	cermet anodes. Conduct in-situ anode coating tests.	
		Test most promising cathode bonding techniques under cell conditions. Project long-term dissolution rates for cathode materials.	Determine fabrication and processing methods for anode sections to be tested in 3-20K amp cells. Initiate design of large test cell (3-20K amp) for experiments on selected inert anode and cathode materials.
		Complete analysis of bath chemical structure. Determine feasibility of achieving in situ stabilized aluminum metal pad by means of controlled impurity saturation. Continue analyses of anode corrosion mechanisms. PNL, MIT, TBD	Carry out experiments on cerium oxide and titanium diboride saturation systems, using bench cells, as a means to control cathode dissolution. PNL
	$1,500	$1,000	$500
Materials Processing	Procurement and installation of 17 inch horizontal moving mold caster and vertical casting test unit completed. Horizontal feeding system selected. U.S. Steel/Bethlehem	Conduct steel thin slab casting tests, using horizontal moving mold caster and vertical system test unit, to determine how changes in operating variables affect product characteristics and quality. Document results. U.S. Steel/Bethlehem	Complete tests using both horizontal and vertical units for thin slab casting technology and final report on results. U.S. Steel/Bethlehem
	Testing continued on single wheel design for casting 4-inch wide thin steel strip. Westinghouse/ARMCO	Complete experimants using 4-inch single wheel planar flow caster, with application of electromagnetic forces to achieve surface quality. Final report on results. Westinghouse/ARMCO	No Activities.
	Funded laboratory research on non-isothermal carbothermic reduction of alumina, and metal separation trials. MIT, ANL	Continue laboratory research on non-isothermal carbothermic reduction of alumina, and metal separation trials. MIT, ANL	Complete lab research on metal separation technique for Al-Sn-Si alloy produced by lower temperature carbothermic reductions. Laboratory research on the carbothermic reduction of fine iron ore concentrates without pelletizing. MIT, ANL, TBD
	$13,901	$4,800 *	$900
		* $1,400 is proposed for rescission.	
	Completed initial experiments to	Construct bench scale horizontal and	No Activities.

Program Activity	FY 1986	FY 1987	FY 1988
	establish operating conditions for electromagnetic casting of steel. Constructed experimental equipment for evaluating new process to extract copper from scrap steel. ANL (Steel Initiative) $250	vertical casters for EM casting of steel. Commence test operations. These activities utilize $6,884 of FY 1986 funds as well as $2,000 of new budget authority. ANL $2,000 * * $1,000 is proposed for rescission.	
Sensors and Controls	Continued development of sensors for on-line control of industrial processes that operate in extreme conditions of temperature, corrosive environment and pressures. Potential applications include molten steel analysis, 2 phase flow measurement, thermal profile of hot solids, lignin assay, humidity and combustion. Evaluated other sensors required for improved process efficiency, identified priority project areas, and developed a program plan to conduct R&D. These activities utilized $125 of FY 1985 funds as well as $2,000 of new budget authority. PNL, NBS, JPL, INEL, Honeywell, Spectral Sciences $2,000	Construct alumina concentration sensors, and initiate tests in commercial reduction cells. Continue testing of selected sensors at paper industry mills. Continue development of sensors, with applications in humidity measurement, in-process property analysis and real-time soil analysis. Based on results of solicitation, initiate sensor research for improved control of distillation, cement production and non-paper drying processes. NBS, INEL, Aguila Trans-met, Spectral Sciences, Honeywell, TBD $2,000	Complete testing of alumina reduction cell sensor for real-time on-line analysis and control. Continue development and testing of: on-machine property sensors for control of paper-making; combustion sensors; consistency sensors. Initiate plant tests of steam flowmeter and humidity sensors. Continue research projects resulting from FY 1987 solicitation on new sensor development needs. PNL, Institute Paper Chemistry, NBS, TBD $1,300
Separations Research	Initiated on-site membrane tests for separations applications in petrochemical and other industries. Continued lab and bench scale tests for concentration of food and caustic solutions with advanced membranes. Initiated R&D on ceramic membranes. Continued research on black liquor properties and combustion.	Complete on-site testing of membranes for organic stream separations and fractionation and concentrations of foods. Complete assessment of membrane applications in the food industry. Conduct laboratory analyses of membrane materials to improve the efficiency of organic streams separations. Continue development of ceramic membranes for making higher temperature separations. Continue research on black liquor properties, concentration and combustion. Complete black liquor	From field test data, optimize membrane systems and process design for organic stream separations. Complete lab tests of organic and ceramic membranes. Prepare process design for fractionation and concentration of foods. Complete initial analysis of effects on black liquor combustion of operating variables. Complete characterization,

Program Activity	FY 1986	FY 1987	FY 1988
		ultra filtration research.	oxidation and reduction tests. Initiate research on inorganic fume formation and gas phase reactions. Continue research on factors which determine efficiency of black liquor recovery.
	Initiated research on drying mechanisms and improved drying technologies in food and paper industries.	Continue laboratory and bench scale research on energy efficient mechanical and thermal drying and dewatering processes. Based on results of solicitation initiate new drying technology research.	Complete design and assembly of experimental facility for testing of advanced paper drying concepts. Initiate tests to determine performance characteristics for thermal/mechanical variables and operating configurations.
	Initiated testing of working substances for a tubeless evaporator. Completed bench scale tests of hydrate freeze separation for application to food processing.	Complete development of working substances for a tubeless evaporation process. Continue development of continuous process for separation of multi-component dilute solutions by liquid chromatography. Pursue materials research for process development unit to separate oxygen from air.	Continue development of liquid chromatography separations process. Initiate field tests for tubeless evaporation process. UOP, NFPA, U. Wisc., U. Florida, U. Maine, IPC, Schroeder, ORNL, TBD
	These activities utilized $570 of FY1985 funds as well as $1,952 of new budget authority. Heist Eng., State Univ. of N.Y., UOP, Champion, Physical Sciences, Inc., Univ. of Wisc., Nat'l Food Proc. Assn., Inst. Paper Chemistry, Univ. Florida, NBS, INEL, Schroeder, Memrane Technology Research, Univ. Maine, Purdue	These activities utilize $8 of FY 1986 funds as well as $3,000 of new budget authority. Purdue, NFPA, UOP, Univ. of Maine, U. Flordia, Champion, IPC, Schroeder, MTR, PSI, U. Wisc., INEL, ORNL, Air Products, TBD	
	$1,952	$3,000	$1,900
Coatings	Continued development of dry coating system for textiles. Complete bench scale tests for spray coating and fluid bed coating systems. Completed testing of amorphous metallic coating for adhesion, stability, and corrosion resistance. Coated specimens	Continue development of dry coating system, with emphasis on the use of xerography for applying printed patterns to textiles. Georgia Tech.	No Activities.

III. Industrial Process Efficiency (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	for exposure testing in an industrial environment. JPL, Georgia Tech. $400	$500	$0
Subtotal industrial Process Efficiency	(TOA $20,698) BA $20,003	(TOA $20,192) BA $13,300	$4,600

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

INDUSTRIAL ENERGY CONSERVATION

I. Preface: Industrial Cogeneration

The objective of the Industrial Cogeneration Subprogram is to conduct research on new improved energy conversion systems which offer energy conservation benefits not available in present day technology such as higher electrical to thermal output and choice of alternative fuel systems to provide greater fuel flexibility to the industrial sector. This research is addressed in two subprogram areas: advanced topping cycle systems and direct conversion of thermal to electrical energy. A third subprogram area, advanced bottoming cycles, addresses component and working fluid development for lower cost and more energy effective systems.

- Advanced Topping Cycle Systems: Increased use of industrial cogeneration can be fostered through development of higher electrical-to-thermal output ratio systems than are yielded by standard steam turbine concepts. In addition development of technologies which utilize coal as a fuel permit flexibility of fuel choice. The development of innovative cogeneration systems will aid in meeting a projected growth for cogeneration of over 80,000 M.W. by the year 2000.
- Conversion of Thermal Energy to D.C. Electricity: Direct conversion devices, such as the thermionic diode and the alkalai metal heat engine, may be able to cost-effectively meet some of industry's 5,000 megawatt requirement for relatively low voltage d.c. power used in electrolytic cells and other industrial processes.
- Advanced Bottoming Cycles: Development of low cost components, more effective working fluids, and improved heat transfer equipment to utilize the potential of 4,000 megawatts of electric power from low temperature (700 degrees F) waste heat from industrial processes.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Advanced Topping Cycle Systems	$3,378	$3,500	$800	-77
Thermal to Electrical Energy Conversion	1,100	1,000	700	-30
Advanced Bottoming Cycle Systems	0	500	0	-100
Total, Industrial Cogeneration	$4,478	$5,000	$1,500	-70

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$1,838	$2,052	$250	-88

III. Activity Descriptions

III. Industrial Cogeneration (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Industrial Cogeneration			
Advanced Topping Cycle Systems	Continue development of an externally coal-fired Brayton System. Complete coal combustion topping tests for externally fired Brayton system performance. Perform a design study for use of a lower temperature gas turbine to eliminate a topping combuster.	Continue development of the externally coal-fired Brayton System. Complete fabrication and installation of the first air heater test sections at the Rockwell test station. Perform facility modifications to prepare for testing.	
	Complete the parametric design for a steam diesel test engine. Complete the design of generic requirements for the test engine installation. Establish an industry interaction group to review test results and share in test engine planning. These activities utilize $660 of FY1985 funds as well as $3,378 of new budget authority. ANL, Westinghouse, Battelle-Columbus	Initiate the steam diesel component wear rate study and initiate laboratory testing of a small scale laboratory steam diesel surrogate to determine wear rates. Complete a study on high performance steam turbine systems. Initiate laboratory unit design and fabrication of a high temperature steam generator. These activities utilize $37 of FY1986 funds as well as $3500 of new budget authority. ANL, Westinghouse, Solar, TBD	Continue laboratory testing and evaluation of wear rates on steam diesel components. Conduct laboratory work on high performance steam systems. TBD
	$3,378	$3,500	$800
Thermal to Electric Energy Conversion	Continue development of a larger more efficient thermionic diode which is more economic to manufacture. Build engineering prototypes and conduct laboratory tests. Design and fabricate a 1,000 watt sodium heat engine laboratory unit. TECO, Science Lab of Ford Motor Co.	Evaluate new materials and design concepts for improved thermionic diodes. Continue development and testing of the 1,000 watt sodium heat engine laboratory model. Compare with predicted performance. Investigate beta aluminum electrode/sodium vapor interface for improved long-term performance. Ford, TBD	Continue development and testing of the 1,000 watt sodium heat engine for improved performance. Perform preliminary assessment of sodium heat engine applications. Ford, TBD
	$1,100	$1,000	$700
Advanced Bottoming Cycle Systems		Complete the Organic Rankine Cycle (ORC) working fluid evaluation. ANL	
		$500	

III. Industrial Cogeneration (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Subtotal Industrial Cogeneration	(TOA $5,138) BA $4,478	(TOA $5,037) BA $5,000	$1,500

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KEY ACTIVITY SUMMARY

INDUSTRIAL ENERGY CONSERVATION

I. Preface: Implementation and Deployment

The Implementation and Deployment subprogram is a cooperative effort between government and industry to enhance industry awareness about the necessity of energy efficiency improvements and the cost effectiveness of investment in energy conservation. For a variety of reasons, an information gap often exists between the source of a technology and potential users. Significant energy savings are achievable if these gaps can be closed through an effective program of technology and information transfer.

Workshops and Seminars: This provides cooperative support in the conduct of workshops, seminars and technical symposia on industrial energy conservation. Support may be provided for events both initiated and cosponsored by the DOE. Activities will be conducted as opportunities arise, having as their objective more effective technology transfer and improved energy productivity. Cooperative presentations will be made, on both specific technologies and general process improvements, with the major industrial trade associations and, as appropriate, National engineering and professional societies.

Publications: Information publication and dissemination are important elements of technology transfer. Publications concerning new and underutilized energy efficiency technologies, with particular emphasis on those which have been developed with the assistance of the DOE, will be produced and distributed. These publications cover not only specific technologies but also address overall energy management for major industrial sectors.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Industrial Reporting Program	$300	$0	$0	0
Energy Analysis and Diagnostic Centers	1,378	1,400	0	-100
Technology and Information Transfer	1,054	1,000	500	-50
Total, Implementation and Deployment	$2,732	$2,400	$500	-79

II. B. Major Laboratory and Facility Funding

Pacific Northwest Laboratory	$665	$300	$0	-100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Implementation and Deployment			
Industrial Reporting Program	Continue receipt and analysis of reports on energy efficiency improvements and recovered materials. Publish DOE annual report on industrial energy efficiency improvement. Request change in legislation to eliminate program. ORNL	Legal requirement for program repealed by Section 3101 of Public Law 99-500 "Omnibus Budget Reconciliation Act," (Oct. 18, 1986).	No Activities.
	$300	$0	$0
Energy Analysis and Diagnostic Centers	Continuation of program to conduct audits, with participating universities. Implement, with industry and utilities, ways in which the EADC concept could be leveraged for wider coverage. Univ. City Science Center	Continuation of program to conduct audits, with participating universities. Implement, with industry and utilities, ways in which the EADC concept could be leveraged for wider coverage. These activities utilize $27 of FY 1986 funds as well as $1,400 of new budget authority. TBD	State and local governments, the participating universities, or the private sector may provide support to continue some EADC services.
	$1,378	$1,400	$0
Technology and Information Transfer	Support of technical meetings and symposia devoted to industrial energy use and efficiency. Conduct workshops on selected new technologies. These activities utilize $106 of FY1985 funds as well as $1,054 of new budget authority. PNL, SMC	Continue to provide support in the conduct of workshops, seminars, and technical symposia on industrial energy conservation. Particular focus on technologies developed with DOE assistance. Develop, publish and distribute written materials which address specific energy-saving technologies, as well as overall energy management for major industrial sectors. These activities utilize $438 of FY 1986 funds as well as $1000 of new budget authority. PNL, Energetics, TBD	For essential topics continue to develop, publish, and distribute written materials focusing on DOE-developed technologies. Some support will be provided for critical workshops and seminars. Energetics, TBD
	$1,054	$1,000	$500
	(TOA $2,838)	(TOA $2,865)	
Subtotal Implementation and Deployment	BA $2,732	BA $2,400	$500

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KEY ACTIVITY SUMMARY

INDUSTRIAL ENERGY CONSERVATION

I. Preface: Program Direction

A total of 26 full time equivalent (FTE) positions are provided for headquarters management of the program. This represents the minimum level of staffing required to maintain effective program management and support at the FY 1988 budget request.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Total, Industrial Program Direction	$2,063	$2,070	$1,614	-22

II. B. Major Laboratory and Facility Funding

Non-Applicable.

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Program Direction	Continue staffing at a level of 27 FTEs. Provide salaries, benefits and travel for staff to manage Industrial Energy Conservation Programs. $2,063	Provide salaries, benefits and travel for 35 FTEs to manage Industrial Energy Conservation Programs. $2,070	Provide salaries, benefits and travel for 26 FTEs to manage Industrial Energy Conservation Programs. $1,614
	(TOA $2,063)	(TOA $2,070)	
Subtotal Program Direction	BA $2,063	BA $2,070	$1,614

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KEY ACTIVITY SUMMARY

INDUSTRIAL ENERGY CONSERVATION

I. Preface: Capital Equipment

No Activities.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Capital Equipment	$0	$0	$0	0

II. B. Major Laboratory and Facility Funding

Non-Applicable.

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Capital Equipment	The funds were for instrumentation and equipment needed at the National Laboratories for ongoing research and development programs. This activity uses $84 of FY 1985 funds. $0	The funds are for instrumentation and equipment needed at the National Laboratories for ongoing research and development programs. This activity uses $26 of FY 1986 funds. $0	No Activities. $0
Subtotal Capital Equipment	(TOA $84) BA $0	(TOA $26) BA $0	$0

III. Capital Equipment (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	(TOA $42,272) BA	(TOA $42,869) BA	
Total Industrial Energy Conservation	$40,708	$35,026	$16,035

OBJECT CLASS

Industry

Direct Funding:	FY1986 Actual	FY1987 Estimates	FY1988 Estimates
11.0 Personnel Compensation:			
11.1 Full-time permament	$1,614	$1,679	$1,263
11.3 Other than full-time Permanent	0	0	0
11.5 Other Personnel Compensation	81	84	63
11.9 Total Personnel Compensation	1,695	1,763	1,326
12.1 Personnel benefits	178	185	139
13.0 Benefits for former personnel	0	0	0
21.0 Travel and Transportation of Persons	136	115	144
25.0 Other Services	38,699	32,963	14,426
31.0 Capital Equipment	0	0	0
32.0 Lands and Structures	0	0	0
41.0 Grants, subsidies, and contributions	0	0	0
Totals	$40,708	$35,026	$16,035

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ENERGY CONSERVATION

OVERVIEW

Transportation

The transportation sector used 19.9 quads of energy in 1985, the vast majority of which was in the form of oil. Transportation petroleum consumption was approximately 10 million barrels per day, which accounted for 63 percent of all petroleum consumed and 27 percent of all energy used in the United States.

The goal of the transportation conservation program is to improve energy efficiency and enhance the flexibility of fuel use options in transportation related technologies. This goal is underscored by the fact that such technologies have potentially significant leverage on the U.S. and world oil situation. Reductions in U.S. transportation oil use can enhance energy security, reduce oil imports and related trade payments to foreign countries, and enhance economic growth.

The specific objectives in support of increasing fuel efficiency include:

- To develop scientific knowledge and proof-of-concepts for advanced automotive engine technology that demonstrate at least 30 percent improvement in fuel efficiency, capability to meet emissions, safety and noise standards, and competitive initial and life cycle costs when in production.
- To develop advanced, high-efficiency technology for heavy-duty diesel operation under uncooled and minimum friction conditions, including waste heat utilization, with the potential for 40 percent fuel economy improvement over 1982 technology.
- To establish a fundamental ceramic and advanced materials technology base to support the U.S. heat engine industry.

The specific objectives in support of enhancing the flexibility of fuel use options of engines used in transportation activity include:

- To overcome key technological barriers, particularly relating to energy storage, concerning private sector development of electric and hybrid vehicles.

- o To encourage the development of alternative technologies by providing industry with fundamental scientific information on the properties and behavioral characteristics of alternative transportation fuels made from oil shale, coal, and biomass.

The strategy employed to achieve the objectives involves a number of steps. Program focus is on the largest petroleum using activities in the transportation sector. Autos and light trucks currently account for about 60 percent of transportation's petroleum use. Therefore, R&D efforts are focused on the automobile and light truck market and on the second largest petroleum consuming market -- heavy trucks and buses. The size of petroleum use in the transportation sector and the importance of relatively small efficiency improvements on U.S. petroleum consumption is noted by the fact that a 10 percent reduction in gasoline use by automobiles and light trucks (achieved by efficiency improvements) would be 35 percent more than all the imported oil from Arab OPEC countries in 1985 and be worth about $10 billion in lower motor fuel bills paid by vehicle users. In addition to saving petroleum by making vehicles in the transportation sector more efficient, it is also possible to save petroleum by permitting the engine designers more flexibility with respect to the type of fuel for which the engines can be designed. Potential petroleum savings of 14.7 quads (6.5 quads via efficiency improvements plus 8.2 quads via fuel substitutions) in the transportation sector are possible by the year 2010.

Specific technology needs are identified in concert with industry. This is accomplished through group and individual meetings with the appropriate representatives of the engine, vehicle, parts, and fuel suppliers. The petroleum savings and other benefits from the specific technology options are estimated and reviewed. With the assistance of industry participation, the technology options are placed in priority order. Care is taken to avoid any duplication of R&D that might be conducted by industry on its own. Contracts are made with industry participants and research institutions to conduct the R&D. Cost sharing is achieved to the maximum extent possible, and ranges from zero to fifty percent with an average of twenty percent.

Research is conducted according to multi-year plans with milestones and deliverables. Annual contractor coordination meetings and frequent program review meetings are held to check on the success of the R&D efforts. The results of R&D are transferred to the user community through meetings and reports. In most cases, the ultimate user of the technology was a cost-sharing participant in the R&D and this ensures that the technology transfer is successful.

To carry out the program, the activities have been defined in five major programs areas:

Vehicle Propulsion R&D: The objectives of this program are: (1) achieving at least a 30 percent improvement in fuel economy over conventional current production heat engines under similar vehicle weight to horsepower conditions, (2) meeting or exceeding established requirements for regulated emission levels, and (3) operating satisfactorily on a wide variety of fuels. To accomplish these objectives, research and development is being pursued on advanced engine concepts including the automotive gas turbine, the automotive Stirling engine, and the heavy duty adiabatic (low heat rejection) diesel engine. Common to the needs of all advanced heat engine concepts is the requirement to develop improved high-temperature materials and components.

Alternative Fuels Utilization: The goal of this program is to foster the use of nonpetroleum-based transportation fuels by establishing a technology data base for both contemporary and advanced heat engines. Emphasis is placed on synthetic fuels derived from oil shale and coal syncrudes. In addition, research is conducted on biomass-derived fuels and gaseous fuels.

Electric and Hybrid Vehicle R&D: This program addresses the need for improved range, reliability, cost, and performance of electric and hybrid vehicles, giving priority to accelerating technologies to a level suitable for private sector decisions to produce specific-purpose vehicles in the late 1980's to the early 1990's. At the same time, the program supports the development of advanced technology options for full performance vehicles for the late 1990's.

Transportation Systems Utilization: This program area assesses the effects that new transportation equipment, fuels and vehicles will have on the Nation's transportation systems, economy, environment and energy situation and presents the information to program managers for their use in program planning and monitoring. This area also provides a baseline projection of the demand for transportation energy by mode and assures consistency with more general analyses and projections within the Office of Conservation and Renewable Energy and by the Energy Information Administration and others.

Advanced Materials Development: The goal of this program is to develop an industrial technology base in structural ceramics, ceramic composites, and coatings capable of providing reliable and cost-effective components for high-temperature, efficient transportation propulsion systems while eliminating requirements for scarce strategic materials. This technology program consists of a balanced research effort in three areas: (1) materials and processing to develop methods that can yield materials with uniform microstructures and high-temperature mechanical and corrosion-resistant properties necessary to meet the requirements of advanced engine components; (2) design methodology to understand the properties of brittle ceramics under stress well enough to predict accurately their lifetimes in specific engine-component uses; and (3) data base and life prediction to develop techniques, generate concepts, and acquire data on both existing and improved ceramic materials necessary to improve mechanical and environmental reliability.

Another component of the program is the construction of a High Temperature Materials Laboratory, which is nearing completion. It will begin operation in 1987 as a user oriented facility for private industry and university researchers to make use of the state-of-the-art instrumentation and interdisciplinary scientific personnel.

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ENERGY CONSERVATION
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LEAD TABLE

Transportation

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Vehicle Propulsion Research and Development					
Operating Expenses	$32,624	$23,500[1]	$23,500	$ 7,370	-$16,130
Alternative Fuels Utilization					
Operating Expenses	1,423	1,260	1,260	1,100	- 160
Electric and Hybrid Vehicle Research and Development					
Operating Expenses	8,709	13,400[2]	13,400	3,400	- 10,000
Transportation Systems Utilization					
Operating Expenses	897	700	700	400	- 300
Advanced Materials Development					
Operating Expenses	8,746	13,000	13,000	6,657	- 6,343
Capital Equipment	0	1,000	1,000	0	- 1,000
High Temperature Materials Lab					
Operating Expenses	295	1,000	1,000	2,000	+ 1,000
Construction	2,574	0	0	0	0
Program Direction					
Operating Expenses	2,189	2,195	2,195	1,482	- 713
Total	57,457	56,055	56,055	22,409	- 33,646

LEAD TABLE

Transportation (Cont.)

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Operating Expenses	54,883	55,055	55,055	22,409	- 32,646
Capital Equipment	0	1,000	1,000	0	- 1,000
Construction	2,574	0	0	0	- 0
Total Transportation	$57,457	$56,055	$56,055	$22,409	-$33,646
Staffing Total FTE	30	36	36	22	- 14

1/ Includes a pending rescission of $2,500,000.
2/ Includes a pending rescission of $1,000,000.

Authorization:
- P.L. 93-577, "Federal Non-nuclear Energy Research and Development Act of 1974."
- P.L. 93-275, "Federal Energy Administration Act of 1974."
- P.L. 94-438, "Energy Reorganization Act of 1974."
- P.L. 94-163, "Energy Policy and Conservation Act."
- P.L. 94-413, "Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976."
- P.L. 95-91, "Department of Energy Organization Act."
- P.L. 95-238, "Department of Energy Authorizations for FY 1978."
- P.L. 96-512, "Methane Transportation Research, Development and Demonstration Act of 1980."

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SUMMARY OF CHANGES

Transportation

FY 1987 Appropriation enacted	$ 56,055
Adjustments	0
FY 1988 Base	56,055

Vehicle Propulsion R&D

- Develop Automotive Gas Turbine Ceramic Components with One Industry Team	-6,000
- Conclude Automotive Stirling Engine Development	-8,000
- Reduce Adiabatic Diesel Research and Development	-1,600
- Carry Out Limited Technology Assessment and Transfer	- 530

Alternative Fuels Utilization

- Reduce Synthetic Fuels Investigations	- 160

Electric and Hybrid Vehicle R&D

- Conclude Single-Shaft A.C. Propulsion System Development	-2,750
- Reduce Battery R&D for Electric Vehicle Application	-3,450
- Develop Dual-Shaft A.C. Propulsion System Technology	- 400
- Eliminate Battery and Powertrain Technologies Testing and Site Operator Support	-2,400
- Complete Phase I only of Fuel Cell/Battery Hybrid Powered Bus Program	-1,000

Transportation Systems Utilization

- Eliminate Publication and Distribution of the Gas Mileage Guide	- 700
- Collect, Analyze, and Present Transportation and Energy Data	+ 400

SUMMARY OF CHANGES

Transportation (Cont.)

Advanced Materials Development	
- Reduce R&D on Structural Ceramics for Advanced Heat Engine Application	-6,343
High Temperature Materials Laboratory	
- Support Operations of User Facilities	+1,000
Capital Equipment	
- Complete Acquisition of Equipment for Advanced Materials Program	-1,000
Program Direction	
- Reduce Staffing Levels by 14 FTE	- 713
FY 1988 Congressional Budget Request	$ 22,409

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KEY ACTIVITY SUMMARY

TRANSPORTATION

I. Preface: Vehicle Propulsion R&D

The goal of the Vehicle Propulsion R&D program is to encourage development within the automotive industry of more fuel-efficient, fuel-flexible and cost-effective transportation heat engine propulsion system options through support of research and development on technological barriers and proofs-of-concept.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Automotive Gas Turbine	$14,283	$10,000	$4,000	-60
Automotive Stirling Engine	14,283	8,000	0	-100
Heavy Duty Transport (Adiabatic Diesel)	2,858	4,500	2,900	-36
Technology Assessment and Transfer	1,200	1,000	470	-53
Total, Vehicle Propulsion R&D	$32,624	$23,500	$7,370	-69

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988	$ Change
Argonne National Laboratory....................................	$270	$299	$0	-100
Oak Ridge National Laboratory..................................	$170	$220	$55	-75
Pacific Northwest Laboratory	$65	$30	$0	-100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Automotive Gas Turbine	Complete proof-of-concept automotive gas turbine engine development with two industry teams (Garrett/Ford and Allison/Pontiac) reaching engine dynamometer testing of completely ceramized configuration.	Initiate ceramic component development with two industry teams fabricating components and evaluating performance using experimental engine test beds.	Continue ceramic component development with a single integrated test bed evaluation methodology.
	$14,283	$10,000 (1)	$4,000

(1) $2,500,000 is proposed for rescission in the Automotive Gas Turbine program. If approved, negotations will be conducted with both teams and the ceramic suppliers they share to create a single cooperative effort that requires approximately half the level of Federal support required by the current two-team arrangement. This action of combining the teams or cancelling one team will recover the estimated $2,500,000.

III. Vehicle Propulsion R&D (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Automotive Stirling Engine	Fabricate and conduct preliminary evaluation of experimental MOD II engines and components (MTI and United Stirling AB of Sweden). $14,283	Complete testing and evaluation of completed MOD II engines both in a dynamometer and in a vehicle. This activity completes the agreed plan of work. $8,000	No Activities. $0
Heavy Duty Transport (Adiabatic-Diesel)	Initiate component evaluations of developed ceramic components in single-cylinder test cell and utilize results for second stage component developments; complete design of baseline engine configurations; initiate industry design of multi-cylinder heavy duty proof-of-concept adiabatic diesel engine. $2,858	Continue component evaluations in single-cylinder test cells; continue industry design of baseline multi-cylinder adiabatic diesel system; conduct initial experimental uncooled engine emissions evaluations; complete heat transfer models for adiabatic diesel operation; initiate high temperature liquid lubrication development and innovative piston-cylinder configurations. $4,500	Continue thermal barrier coatings development, advanced adiabatic diesel reference engine design, emissions and combustion characteristics investigation; initiate piston-cylinder gas lubricated development and systems integration investigations to determine vehicle/propulsion system design parameters. $2,900
Technology Assessment and Transfer	Continue vehicle propulsion technology assessments in industry and government; conduct technology transfer activities, including conferences, workshops, publications, etc., to assure transfer of technology developed within DOE to other government agencies and industry, using new budget authority and $220 of unobligated carryover funding. $1,200	Continue vehicle propulsion technology assessments in industry and government; conduct technology transfer activities, including conferences, workshops, publications, etc., to assure transfer of technology developed within DOE to other government agencies and industry, using $1,000 of new budget authority and $3 of unobligated carryover funding. $1,000	Continue vehicle propulsion technology assessments in industry and government; conduct technology transfer activities, including conferences, workshops, publications, etc., to assure transfer of technology developed within DOE to other government agencies and industry. $470
Subtotal Vehicle Propulsion R&D	(TOA $32,844) BA $32,624	(TOA $23,503) BA $23,500	$7,370

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KEY ACTIVITY SUMMARY

TRANSPORTATION

I. Preface: Alternative Fuels Utilization

The goal of the Alternative Fuels Utilization program is to foster the use of nonpetroleum-based transportation fuels by establishing a technology data base for utilization of synthetic, biomass-derived, and gaseous fuels in both contemporary and advanced heat engines.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Alcohols	$0	$220	$300	36
Synthetic Fuels	1,223	1,040	800	-23
Methane	200	0	0	0
Total, Alternative Fuels Utilization	$1,423	$1,260	$1,100	-13

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988	$ Change
Oak Ridge National Laboratory	$1,130	$395	$375	-5

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Alternative Fuels Utilization			
Alcohols	Continue to evaluate Government fleet operations with methanol-fueled vehicles to provide industry with technical and operational data to make production and marketing decisions, using $128 of unobligated carryover funding.	Continue data collection and analysis on Federal methanol-fueled vehicles at three site locations, including a cold-weather site, using $220 of new budget authority and $3 of unobligated carryover funding.	Continue data collection and analysis on Federal methanol-fueled vehicles.
	$0	$220	$300

III. Alternative Fuels Utilization (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Synthetic Fuels	Continue performance, emissions, wear, and optimization investigations on conventional and advanced engines using synthetic fuels; perform single- and multi-cylinder dynamometer tests; update information data base and industry interface; provide industry and scientific community with standardized test fuels. $1,223	Continue to generate data on conventional and adiabatic diesel single- and multi-cylinder engines using synthetic fuels with varying properties, including performance, emissions, wear, and optimization investigations; make test fuels for project activities and continue to provide industry and scientific community with standardized test fuels. $1,040	Continue investigations on performance, emissions and wear with advanced and conventional engines using synthetic fuels. Continue operation of synthetic test fuels facility. Complete experimental screening of high-temperature combustion chamber impacts with synthetic fuels. Integrate "second generation" coal and shale liquid into synthetic test fuels facility. $800
Methane (Gaseous Fuels)	Conclude investigation of technology and institutional barriers; conduct performance and emissions evaluations and update information data base. $200	No Activities. $0	No Activities. $0
Subtotal Alternative Fuels	(TOA $1,551) BA $1,423	(TOA $1,263) BA $1,260	$1,100

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KEY ACTIVITY SUMMARY

TRANSPORTATION

I. Preface: Electric and Hybrid Vehicle R&D

The goal of the Electric and Hybrid Vehicle R&D program is to develop the technology in cooperation with industry that will lead to the production and introduction of electric vehicles into the Nation's transportation fleet and substitute more abundant sources of energy for petroleum-based fuels.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Electric Vehicle Battery R&D				
Lead-acid	$880	$775	$0	-100
Zinc-bromine	550	500	500	0
Sodium sulfur	125	1,000	1,300	30
Nickel-iron, nickel-cadmium, iron-air, lithium metal-sulfide	2,067	2,975	0	-100
Electric Vehicle Propulsion Systems				
Single Shaft	1,190	2,750	0	-100
Dual Shaft	2,000	2,000	1,600	-20
Fuel Cell Hybrid Bus	0	1,000	0	-100
Test and Evaluation				
In-Vehicle and Dynamometer Testing	1,350	1,900	0	-100
Data Analysis and Site Operations	434	500	0	-100
Technology Assessment and Transfer	113	0	0	0
Total, Electric Vehicle Propulsion Systems	$8,709	$13,400	$3,400	-75

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988	% Change
Argonne National Laboratory	$665	$690	$0	-100
Idaho National Engineering Laboratory	$2,350	$2,140	$150	-93
Oak Ridge National Laboratory	$0	$50	$0	-100
Sandia Laboratories	$675	$240	$200	-17
Pacific Northwest Laboratory	$10	$10	$0	-100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Electric Vehicle Battery R&D	Continue development of lead-acid (Johnson Controls) proof-of-concept complete battery systems, conduct R&D on flow-through and immobilized electrolyte effort of lead-acid battery.	Continue development of an optimized flow-through electrolye lead-acid battery concept and advanced lead-acid gel-cell and bi-polar concepts.	No Activities.
	$880	$775	$0
	Complete development of packaging, thermal management and optimum cell and module configuration analysis of sodium-sulfur battery for EV application.	Continue development of complete sodium-sulfur battery technology including thermal management and optimum cell configuration for electric vehicle application.	Continue development of sodium-sulfur battery technology including subsystem thermal management; complete testing of module incorporating cells optimized for EV application developed in FY 1987.
	$125	$1,000	$1,300
	Develop zinc-bromine (Johnson Controls) battery technology for electric vehicle application.	Continue development of zinc-bromine battery subsystem for electric vehicle application.	Continue development of zinc-bromine battery subsystem for electric vehicle application; initiate testing of full proof-of-concept battery incorporating optimized technology developed during previous 2 years.
	$550	$500	$500
	Develop nickel-iron (Eagle Picher), iron-air (Westinghouse), and nickel-cadmium (ERC) battery technology.	Continue development of a nickel-iron complete battery system and nickel-cadmium battery technology; expand iron-air cell and module developments into full-size vehicle subsystem; define lithium metal-sulfide laboratory battery attributes; enhance sodium-sulfur and zinc-bromine battery development.	No Activities.
	$2,067	$2,975	$0
Electric Vehicle Propulsion Systems	Complete first generation of single-shaft a.c. propulsion system and evaluation of advanced battery systems; continue development of the second generation single-shaft a.c. propulsion system (ETX-II) including an improved a.c. permanent magnet motor and control system and advanced battery system (Ford Motor Co.) using new budget	Continue detailed design of the second generation single-shaft a.c. propulsion system (ETX-II); transfer design to industry.	No Activities.

Program Activity	FY 1986	FY 1987	FY 1988
	authority and $480 of prior year deobligations.		
	$1,190	$2,750	$0
	Continue advanced dual-shaft a.c. propulsion system technology development program (Eaton Corp.).	Continue advanced dual-shaft a.c. propulsion system technology development, including dynamometer testing of powertrain performance and fabrication and test of testbed vehicles.	Complete advanced dual-shaft a.c. propulsion system technology development including nickel-iron battery subsystem.
	$2,000	$2,000	$1,600
	No Activities.	Initiate a phosphoric-acid fuel cell development program to develop phosphoric-acid/battery hybrid powered bus technology.	No Activities.
	$0	$1,000	$0
Test and Evaluation	Continue laboratory and in-vehicle dynamometer testing and analysis of new battery, powertrain and vehicle technologies at the Idaho National Engineering Laboratory. Conduct performance characterization testing of the prototype field test van developed jointly by DOE and EPRI. Identify charge/discharge sensitivity of immobilized electrolyte batteries to temperature variations. Evaluate performance and life cycle of experimental batteries in controlled laboratory.	Continue laboratory and in-vehicle dynamometer testing and analysis of new battery, powertrain and vehicle technologies at the Idaho National Engineering Laboratory. Evaluate charge/discharge sensitivity of immobilized electrolyte batteries to temperature variations. Evaluate performance and life cycle of experimental batteries in controlled laboratory.	No Activities.
	$1,350	$1,900 (1)	$0
	Continue to evaluate vehicle performance and collect data with emphasis on the viability of new technologies integrated into operational fleet vehicles. Evaluate additional new technologies in fleet operations through Site Operators' User Task Force.	Continue to evaluate vehicle performance and collect data with emphasis on the viability of new technologies integrated into operational fleet vehicles. Continue to evaluate additional new technologies in fleet operations through Site Operators' User Task Force.	No Activities.
	$434	$500	$0

III. Electric and Hybrid Vehicle R&D (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Technology Assessment and Transfer	Continue technology transfer activities including a meeting for vehicle users, manufacturers, and the research community to discuss current progress and future coordinated R&D efforts; conduct workshops on battery maintenance training for new technologies; hold seminars for the evaluation of advanced EV technologies and disseminate information in a timely fashion. $113	Print the EHV Annual Report to Congress and other special electric vehicle reports using $4 of unobligated carryover funding. (Technology transfer activities will be conducted as part of program activities.) $0	No Activities. (Technology transfer activities will be conducted as part of program activities.) $0
Subtotal Electric and Hybrid Vehicle R&D	(TOA $9,189) BA $8,709	(TOA $13,404) (1) BA $13,400 (1)	$3,400

(1) $1,000,000 is proposed for rescission in the area of testing and evaluation.

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KEY ACTIVITY SUMMARY

TRANSPORTATION

I. Preface: Transportation Systems Utilization

The goal of this program is to assess the effects of the transportation R&D program and to provide information on current and projected transportation demand and energy use to the program managers. No funds are being requested for the publication and distribution of the Gas Mileage Guide. Gas mileage information is required on the stickers of all new cars. DOE will encourage the private sector (automobile publications and newspapers) to print the fuel economy information when it is released each new model year by the Environmental Protection Agency. This approach is capable of reaching a much wider audience than DOE publication of the Guide.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Gas Mileage Guide	$612	$700	$0	-100
Analysis and Assessment	285	0	$400	0
Total, Transportation Systems Utilization	$897	$700	$400	-43

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988	% Change
Argonne National Laboratory......................................	$100	$61	$150	146
Oak Ridge National Laboratory....................................	$185	$140	$250	79

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Gas Mileage Guide	Complete the publication and distribution of the Gas Mileage Guide for model year 1986, using $296 of unobligated carryover funding. $0	Complete the publication and distribution of the Gas Mileage Guide for model year 1987, using $132 of unobligated carryover funding. $0	No Activities. $0

III. Transportation Systems Utilization (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	Publish and distribute the Gas Mileage Guide for model year 1987; request DOE Policy Office to conduct survey to show the declining use of the Guide. $612	Publish and distribute the Gas Mileage Guide for model year 1988. $700	No Activities. $0
Analysis and Assessment	Continue to collect, analyze and present transportation and energy data in the form of an annual "Transportation Energy Data Book"; continue to assess market conditions for fuel efficient technologies; continue to prepare baseline projections of future transportation energy use for Office program assessments. $285	Continue to assess market conditions for fuel efficient technologies and to prepare baseline projections of future transportation energy use for Office program assessments, using $60 of unobligated carryover funding. $0	Collect, analyze, and present transportation and energy data for use by program managers in their program planning and monitoring. Produce the "Transportation Energy Data Book." Collect and analyze data on the market condition for fuel efficient technologies. Produce the "MPG and Market Shares" report. Update and run the transportation energy model to obtain a detailed consistent baseline projection of the demand for transportation energy by mode. Produce the "Transportation Projection" report. $400
Subtotal Transportation Systems Utilization	(TOA $1,193) BA $897	(TOA $892) BA $700	$400

KEY ACTIVITY SUMMARY

TRANSPORTATION

I. Preface: Advanced Materials Development

The goal of the Advanced Materials Development program is to develop an industrial technology base in structural ceramics, ceramic composites, and coatings capable of providing reliable and cost-effective components for high-temperature, efficient transportation propulsion systems while eliminating requirements for scarce strategic materials.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Total, Advanced Materials Development	$8,746	$13,000	$6,657	-49

II. B. Major Laboratory and Facility Funding

Oak Ridge National Laboratory..................................	$8,426	$4,400	$3,400	-23

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Ceramic and Ceramic Composites	Continue ceramic technology research projects in materials and processing, ceramic composites, thermal and wear coatings, joinings, design methodology and monolithic structure life testing; continue projects to include scale-up of improved powder synthesis, composites, and life prediction for composite materials.	Continue ceramic technology research projects on powder synthesis of silicon carbide and silicon nitride, ceramic composities using fibers and particles, ceramic coatings for thermal and wear, study of contact interfaces, life prediction for monolithic and composite ceramics, joining ceramics to ceramic and metals, and development of	Continue ceramic technology research projects in ceramic composite processing, thermal and wear coatings, joining of ceramics and time dependent behavior.

III. Advanced Materials Development (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	$8,746	International standards for mechanical testing and characterization of ceramic materials and components. $13,000	$6,657
Subtotal Advanced Materials Development	(TOA $8,746) BA $8,746	(TOA $13,000) BA $13,000	$6,657

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KEY ACTIVITY SUMMARY

TRANSPORTATION

I. Preface: High Temperature Materials Laboratory

The High Temperature Materials Laboratory (HTML) at Oak Ridge, Tennessee, supports efforts both with Government and Industry. The HTML provides a unique capability for high-temperature materials research which (1) makes available a broad multidisciplinary professional staff, (2) provides a common focal point for industrial/university/government participation, and (3) provides access to high-cost research equipment which would otherwise be denied many researchers.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Plant	$2,574	$0	$0	0
Pre-Operational Support activities	295	1,000	2,000	100
Total, High Temperature Materials Laboratory	$2,869	$1,000	$2,000	100

II. B. Major Laboratory and Facility Funding

	FY 1986	FY 1987	FY 1988	$ Change
Oak Ridge National Laboratory	$2,869	$1,000	$2,000	100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
High Temperature Materials Laboratory	Required funding to complete construction, using new budget authority and $5 of unobligated carryover funding.	Procure accessory items for the user facility, e.g., dimpler for thinning electron microscope specimens, using $4 of unobligated carryover funding.	No construction or capital equipment.
	$2,574	$0	$0

III. High Temperature Materials Laboratory (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	Continue pre-operational support activities. $295	Continue pre-operational support activities and initiate placement of personnel for the permanent User Staff. $1,000	Support 13 scientific staff dedicated to user facilities and building maintenance and operations. $2,000
Subtotal High Temperature Materials	(TOA $2,874) BA $2,869	(TOA $1,004) BA $1,000	$2,000

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KEY ACTIVITY SUMMARY

TRANSPORTATION

I. Preface: Capital Equipment

The funds requested provide for the acquisition or fabrication of capital equipment not related to construction projects.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, Capital Equipment	$0	$1,000	$0	-100

II. Major Laboratory and Facility Funding

Oak Ridge National Laboratory..................................	$0	$1,000	$0	-100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Advanced Materials Development	Continue to acquire unique laboratory equipment, using unexpended prior year obligations. $0	Purchase equipment to complete the x-ray microfocus radiography nondestructive evaluation facility and the ceramic test specimen machining facility, and equipment to support research activities in mechanical testing, powder characterization, and high-temperature processing. $1,000	No Activities. $0
Electric and Hybrid Vehicle Test and Evaluation	Continue to acquire unique laboratory equipment, using $85 of unobligated carryover funding.	Purchase equipment to complete the electric and hybrid vehicle test facility at Idaho National Engineering Laboratory, using $122 of unobligated carryover funding.	No Activities.

III. Capital Equipment (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	$0	$0	$0
General Equipment Support	Acquire personal computers and word processors for CE office automation program, using $311 of unobligated carryover funding.	Provide supporting capital equipment to the overall Transportation Program, using $162 of unobligated carryover funding.	No Activities.
	$0	$0	$0
Subtotal Capital Equipment	(TOA $396) BA $0	(TOA $1,284) BA $1,000	$0

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KEY ACTIVITY SUMMARY

TRANSPORTATION

I. Preface: Program Direction

The funds requested provide for FTE positions to develop strategies, plans and resource requirements, and provide the integrated program management necessary to conduct the research and development of the various transportation technologies decribed in the budget request.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Total, Transportation Program Direction	$2,189	$2,195	$1,482	-32

II. B. Major Laboratory and Facility Funding

Idaho National Engineering Laboratory...........................	$8	$8	$0	-100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Program Direction	Provide support for 30 FTE positions to develop strategies, plans and resource requirements, and provide the management necessary to conduct research, development, test and evaluation programs.	Provide support for 36 FTE positions to develop strategies, plans and resource requirements, and provide the management necessary to conduct research, development, test and evaluation programs.	Provide support for 22 FTE positions to develop strategies, plans and resource requirements, and provide the management necessary to conduct research, development, test and evaluation programs.
	$2,189	$2,195	$1,482

III. Program Direction (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Subtotal Program Direction	(TOA $2,189) BA $2,189	(TOA $2,195) BA $2,195	$1,482
Total Transportation	(TOA $58,982) BA $57,457	(TOA $56,545) BA $56,055	$22,409

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OBJECT CLASS

Transportation

Direct Funding:	FY1986 Actual	FY1987 Estimates	FY1988 Estimates
11.0 Personnel Compensation:			
11.1 Full-time permament	$1,715	$1,809	$1,119
11.3 Other than full-time Permanent	0	0	0
11.5 Other Personnel Compensation	86	90	56
11.9 Total Personnel Compensation	1,801	1,899	1,175
12.1 Personnel benefits	189	199	123
13.0 Benefits for former personnel	0	0	0
21.0 Travel and Transportation of Persons	143	90	180
25.0 Other Services	52,750	52,867	20,931
31.0 Capital Equipment	0	1,000	0
32.0 Lands and Structures	2,574	0	0
41.0 Grants, subsidies, and contributions	0	0	0
Totals	$57,457	$56,055	$22,409

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ENERGY CONSERVATION

OVERVIEW

Multi-Sector

The Multi-Sector portion of the energy conservation budget consists of three program areas - Energy Conversion and Utilization Technologies, Inventions and Innovation, and the National Appropriate Technology Assistance Service. Each is described below.

Energy Conversion and Utilization Technologies: The primary mission of the Energy Conversion and Utilization Technologies (ECUT) Program is to expand and solidify the generic technology base that supports initiatives by both the DOE end-use Conservation programs and U.S. private industry to improve the efficiency of energy conversion and utilization systems. ECUT research is aimed at understanding and improving techniques, processes, and materials that push the thermodynamic efficiency of energy conversion and usage beyond the state-of-the-art. ECUT also assesses the current state of energy conservation technologies in foreign countries in order to provide a comparative assessment of U.S. efforts.

There are four distinguishing features of ECUT research: (1) it is a program of directed interdisciplinary research (problem oriented) that anticipates future end-use sector needs, (2) it focuses on solving problems that may be common to more than one energy-consuming sector, (3) it makes a concerted effort to seek out, encourage, and support new ideas and concepts, and (4) it provides predictive models and design tools for use by the private sector in achieving increased energy productivity in energy conversion and end-use applications. ECUT research activities include:

Combustion

- Efforts to understand the conditions in spark-ignition engines which immediately precede engine "knock." It is expected that research advances will lead to automotive engines with higher compression ratios, higher engine efficiencies, higher miles per gallon (mpg) and cleaner exhaust.

- Work with advanced experimental and computational tools is leading to an improved understanding of the stratified charge combustion process. Stratified charge engines offer the potential for higher efficiency and broad fuel flexibility. This process is applicable to the conventional internal combustion engine.

Thermal Sciences

- In advanced energy conversion research, applied and exploratory research is performed in developing an experimentally validated, analytical computer module to be used in the study of loss mechanisms for closed-cycle devices such a Stirling heat engines/heat pumps. Detailed research is performed using a specially designed experimental apparatus to study reversing flow dynamics for heat transfer components, e.g., regenerators. Results will be used by designers to devise new energy conversion systems with increased performance.

- Advanced heat transfer research is directed to enhancement and reliability improvements for heat transfer devices. Applied and exploratory research is performed to establish technical feasibility of innovative concepts, such as direct contact, counterflow heat exchangers. In addition, prediction models are being developed and experimentally validated with accurate determinations of pressure drop and fluidelastic instabilities.

Materials

- An integral part of ECUT Materials research is implementation of the Materials-by-Design concept which aims at applying understanding of the behavior of materials at the atomic level to predict how desired properties can be engineered into a material. This knowledge will be used to improve strength, durability and other characteristics of materials of interest to energy conservation, e.g., high temperature capability intermetallics.

- Initiation of exploratory studies of monolithic ceramics other than the "Big 4" (alumina, zirconia, silicon carbide and silicon nitride) is planned. The purpose of this work is to explore the properties of more complex ceramic systems which may provide clues to circumvent the usual problems encountered in dealing with ceramic materials, e.g., brittleness.

Biocatalysis

- In the area of molecular modeling and applied genetics, it is the intention to establish criteria based on molecular structure which industry may use in developing optimum catalysts for any specified chemical reaction.

- The technology base for bioprocess engineering is being improved through investigation of several innovative high-productivity bench-scale bioreactor concepts. Low productivity of bioprocesses compared to conventional chemical processes is one major impediment to economical, less energy intensive, biochemical chemical production being addressed by ECUT research.

Tribology

- A newly developed theory of tool wear has already been partially verified, and complete experimental verification is anticipated. Preliminary application of this theory indicates that new wear-resistant coating compositions are now possible that will improve hardness by a factor of 20 over currently available coatings. In particular, an optimized composition of titanium zirconium nitride is expected to show this outstanding characteristic.

- Advances are being made in developing high-temperature lubricants and their delivery systems. One successful approach deposits a vapor of phosphate esters at temperatures above 400°C. Such new lubricants and lubrication processes will be needed if "adiabatic" engines are to become a reality. The lubrication research will emphasize vapor deposition techniques, unusual liquid lubricants and solid lubricants.

Inventions and Innovation: The mission of the Inventions and Innovation Programs is to tap the creative resources of individuals and small business in improving national energy supply and utilization. There are two programs: the Energy-Related Inventions Program and the Innovative Concepts Program. The Energy-Related Inventions Program is jointly operated by the National Bureau of Standards and the Department of Energy to evaluate and support promising energy-related inventions and concepts. From program inception in 1974 through 1986, approximately 23,000 inventions have been evaluated and grants awarded totaling $17 million. Of these, 73 inventions have entered the marketplace, generating sales of approximately $200 million. The Innovative Concepts Program solicits and supports the development of novel energy concepts. In FY 1987 the program will conduct a competitive solicitation on innovative energy conversion devices.

National Appropriate Technology Assistance Service: The goal of the National Appropriate Technology Assistance Service (NATAS) is to help the American public investigate and implement appropriate technologies and to help innovators solve problems they have in commercializing energy-saving products and services. The specific objectives of the program are:

- To provide individual engineering, scientific and technical responses to questions and information requests posed by individual home owners, small businesses, farmers, state and local governments and non-profit institutions.

- To provide technical assistance pertaining to business planning, patents, licensing and obtaining private sector financing to inventors and small energy-related firms.

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LEAD TABLE

Multi-Sector

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Energy Conversion and Utilization Technologies					
Operating Expenses	$18,327	$20,358	$20,358	$15,800	-$ 4,558
Capital Equipment	952	1,000	1,000	127	- 873
Total ECUT	19,279	21,358	21,358	15,927	- 5,431
Inventions and Innovation					
Operating Expenses	4,705	5,000	5,000	3,290	- 1,710
National Appropriate Technology and Assistance Service (NATAS)					
Operating Expenses	1,428	1,400	1,400	700	- 700
Energy Conversion and Utilization Technologies					
Capital Equipment	952	1,000	1,000	127	- 873
Program Direction	510	546	546	489	- 57
Subtotal Operating Expenses	24,970	27,304	27,304	20,279	- 7,025
Subtotal Capital Equipment	952	1,000	1,000	127	- 873
Total Multi-Sector	$25,922	$28,304	$28,304	$20,406	-$ 7,898
Staffing					
Total FTE	6	9	9	8	- 1

LEAD TABLE

Multi-Sector (Cont.)

Authorization:
- P.L. 93-577, "Federal Non-nuclear Research and Development Act of 1974."
- P.L. 95-91, "Department of Energy Organization Act."

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SUMMARY OF CHANGES

Multi-Sector

FY 1987 Budget Estimate	$ 28,304
Adjustments	0
FY 1988 Base	28,304
Energy Conversion and Utilization Technologies	
- Continue experimental validation of microemulsion fuel system computer model	+ 200
- Complete research on heat and mass transfer projects	- 800
- Terminate research activities in Advanced Conversion Technology	- 900
- Reduce high-temperature materials research in nickel aluminide	- 800
- Increase emphasis on ceramic materials research	+ 400
- Reduce research effort in lightweight materials and eliminate research in corrosion-resistant materials	- 500
- Reduce bioprocess engineering efforts including completion of research on stabilization of genetic information	- 150
- Reduce catalysis-by-design research	- 358
- Terminate research programs in Applied Microbiology and Bioseparations	- 550

SUMMARY OF CHANGES

Multi-Sector (Cont.)

- Reduce level of effort in research in lubricants	- 100
- Reduce research into mechanisms of friction and wear and eliminate friction and wear testing	- 400
- Complete "Quartet" experiments to develop well-characterized tribological surface modification techniques	- 500
- Complete computer model that describes frictional behavior of piston rings	- 100
Inventions and Innovation	
- Reduce the number of energy-related inventions evaluated and level of non-technical assistance provided to inventions by National Bureau of Standards	- 540
- Reduce funding available for development of energy-related inventions	- 660
- Reduce program planning and evaluation, state initiatives	- 260
- Reduce support for Innovative Concepts Program	- 250
National Appropriate Technology and Assistance Service	
- Reduce level of effort by half	- 700
Capital Equipment	
- Eliminate updating/upgrading of equipment at national laboratories and other research facilities	- 873
Program Direction	
- Reduce FTE's by one	- 57
FY 1988 Congressional Budget Request	$ 20,406

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KEY ACTIVITY SUMMARY

MULTI-SECTOR

I. Preface: Energy Conversion and Utilization Technologies

The Energy Conversion and Utilization Technologies (ECUT) Program supports longer-term higher-risk, generic, applied research and exploratory development necessary to assure the availability of an adequate technology base that will enable a substantial increase in the efficiency of future energy conversion and utilization systems and the use of non-petroleum fuels. ECUT undertakes those activities that address specific technology limiting problems; it is a directed basic research program aimed at processes and materials that improve the efficiency of energy-using components, devices, and systems and their capability to use alternative fuels.

ECUT research activities provide tools useful to the private sector in achieving greater energy productivity, e.g., validated computer models, design and analytical methods, experimental data and correlations, and measurement methods that allow new basic understanding of fundamental concepts to find their proper roles and engineering applications in the energy end-use sectors. ECUT research does not promote or develop a particular hardware: rather, by conducting R&D that addresses specific technology deficiencies, ECUT expands the knowledge base available to the private sector to fully develop and market new generation of energy technologies.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Combustion				
Engine Combustion Technology	$4,075	$4,000	$4,000	0
Continous Combustion	900	800	1,000	25
Thermal Sciences				
Advanced Heat transfer	500	800	0	-100
Advanced Conversion Technology	629	1,000	100	-90
Materials				
High Temperature Materials	3,324	3,600	3,200	-11
Materials by Design	1,396	1,500	1,500	0
Lightweight Materials	800	1,100	800	-27
Corrosion - Resistant Materials	131	200	0	-100
Catalysis/Biocatalysis				
Bioprocess Engineering	2,578	2,400	2,250	-6
Catalysis-by Design	74	608	250	-59
Applied Microbiology	0	250	0	-100
Bioseparations	0	300	0	-100
Tribology				
Lubricants	1,100	1,300	1,200	-8
Mechanisms of Friction and Wear	500	550	250	-55
Friction and Wear Testing	500	100	0	-100
Tribological Surface Modifications and Coatings	1,445	1,050	550	-48
Tribological Design Tools	235	600	500	-17

II. A. Summary Table (Cont'd)	FY 1986	FY 1987	FY 1988	$ Change
International Research Monitoring	140	100	100	0
Conservation Program Analysis and Planning	0	100	100	0
Innovative Concepts	0	0	0	0
Total, Energy Conversion and Utilization Technologies	$18,327	$20,358	$15,800	-22
B. Major Laboratory and Facility Funding				
Argonne National Laboratory	$1,045	$1,200	$925	-23
Idaho National Engineering Laboratory	$60	$1,110	$0	-100
Los Alamos Scientific Laboratory	$1,725	1,700	$1,325	-22
Lawrence Berkeley Laboratory	$440	$500	$390	-22
Lawrence Livermore Laboratory	$375	$375	$300	-20
Oak Ridge National Laboratory	$3,215	$2,925	$2,280	-22
Pacific Northwest Laboratory	$190	$100	$75	-25
Sandia Laboratories	$2,000	$2,200	$1,700	-23
Solar Energy Research Institute	$50	$450	$0	-100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Energy Conversion and Utilization Technologies			
Combustion			
Engine Combustion Technology	Continue in-cylinder laser velocimetry studies of precombustion bulk fluid motion ("swirl" and "squish"). Specific swirl ports and cup-in-piston geometries will be examined as related to development of Direct Injection Stratified Charge (DISC) engines. LANL, SNL, PRINCETON, S-Cubed	Continue a series of carefully controlled experiments on fuel injection flow dynamics and make definitive comparisons with multi-dimensional computer simulations of precombustion, in-cylinder processes.	Continue investigation of fluid mechanics/combustion interactions for internal combustion engines with specific emphasis on the importance of the role of turbulence on the combustion process. Ongoing efforts include experimental and theoretical studies of fuel injection flow dynamics with definitive comparisons using multi-dimensional computer simulations of relevant in-cylinder processes.
	Continue the study of the chemical processes of engine knock and include research on the effects of fluid mechanics and other physical processes	Combine well-defined, simplified engine experiments, flow studies, and realistic engine tests to validate a comprehensive kinetic computer model	Continue to investigate the chemical and physical mechanisms evident with the occurence of engine knock. Extend current modeling efforts to account for

Program Activity	FY 1986	FY 1987	FY 1988
	occuring before, during, and after the knock event. Continue computer model development. LLNL, SNL, MIT	for engine knock with simple fuels. Information gained may lead to an environmentally safe substitute for tetraethyl lead or to more effective blending strategies to interrupt or delay engine knock.	the role of chemical kinetics on complete autoignition phenomena. Work will also include study of the impact of physical processes such as heat transfer on the combustion of fuel in an engine.
	Conduct in-cylinder research on convection and conduction heat transfer processes. Couple with radiation investigation to develop integrated experiments and an analytical model. This work will incorporate the combined impact of all three heat transfer processes on the performance and reliability of advanced engines such as the adiabatic or the open chamber diesel concept. Purdue, Integral Technologies, SAIC	Continue heat transfer research to understand more completely the in-cylinder convection and conduction processes and to develop a more comprehensive multi-dimensional computer model. Research will also include aspects of the impact of heat transfer on engine "knock."	Continue to develop comprehensive experimentally validated multi-dimensional computer model for study and analysis of in-cylinder conduction, convection and radiation heat transfer processes. Research is fundamental to all internal combustion engines but with initial emphasis on diesel.
	Complete preliminary research to characterize the impact of fuel additives on candidate alternative fuels for diesel engines. Recommend strategies for classification of fuel in place of current cetane ratings. SNL	No Activities.	No Activities.
	Perform NOx/particulate trade-off studies of operating diesel engine for engine design optimization of emission characteristics. SNL, Princeton, Purdue	Continue with additional NOx/particulate studies for diesel engines. Use combustion bomb experiments to study the effects of the pressure and temperature of fuel sprays on combustion and emissions formation.	Perform research to study the controlling parameters of direct-injection stratified-charge and Diesel engine combustion with special attention to NOx/particulate formation. Use combustion bomb experiments to study effects of temperature and pressure of fuel sprays in simulated conditions.
	$4,075	$4,000	$4,000
Continuous Combustion	Investigate the effect of fluid mechanics on spray combustion. Extend non-dilute spray computer model to multi-component fuels, including cenosphere formation and combustion. The processes of injection, vaporization, mixing, and combustion affect both system performance and	Begin experiments on turbulent combustion. Initiate studies on the effect on the combustion processes of the physical and chemical characteristics of the fuel. Continue to investigate the effect of fluid mechanics on spray combustion. Develop multi-component fuel spray model for	Continue experiments on the effect on combustion processes of the physical and chemical characteristics of heavy fuels. Continue effects of fluid mechanics on spray combustion. Complete development of multi-component fuel spray for combustion designers.

III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	pollutant emissions. This research focuses on improving the understanding of spray atomization and the temperature, pressure, oxygen mass formation, and flow velocities experienced by the liquid fuel. Current information is inadequate for combustor designers' present and future needs. NBS, SNL, LANL, JPL	use by combustor designers.	
	Continue the development of the microemulsion fuels technology data base. Experimentally validate the computer model of micro-emulsion fuel systems. The technology data base will be suitable for use by fuel and additive developers, enabling them to tailor alternative fuels for specific applications. ORNL	Continue experimental validation of computer model of micro-emulsion fuel systems. Finalize model.	No Activities.
	Determine the effects of such operating parameters as fuel-air ratio, mass flow rates, temperature, and pressure on performance and emissions characteristics of pulse combustion. Initiate work on both liquid and solid fueled systems. Develop a one-dimensional, non-linear computer model of a pulse combustor. Compare the predictions of this model with experimental data to identify further required refinements. SNL	Continue to investigate the basic principle of pulse combustion for gas and solid as well as liquid fuel systems. Research will focus on combustion and heat transfer processes and their interacting effects.	Continue research on pulse combustion. Investigate basic principles for gas, solid and liquid fueled systems. Research is directed to developing comprehensive validated computer model for scaling and optimization.
	Begin experiments on a liquid-fueled Rijke-type pulse combustor. Use viewing windows to observe and photograph and combustion processes. Ga. Tech.	Continue follow-up of the Rijke pulse combustor addressing more fundamental problems, such as the effect of pulsation on spray formation, pulsation combustion, and heat transfer processes.	Complete experiments on a Rijke pulse combustor, fully characterizing the effects of pulsation on spray formation, pulsation combustion, and heat transfer processes.
	$900	$800	$1,000
Subtotal Combustion	(TOA $4,975) BA $4,975	(TOA $4,800) BA $4,800	$5,000

III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Thermal Sciences			
Advanced Heat Transfer	Complete initial research on anomalies between theory and actual generator performance data. PNL	No Activities. $0	No Activities. $0
	Develop computer code for design of heat exchanger without fluid elastic instabilities. ANL	No Activities. $0	No Activities. $0
	Complete initial research on direct contact heat exchanger concepts (to include research on a direct contact concept, the Ranque-Hilsch effect, to develop a high-temperature core coupled with fine particle counterflow to enhance heat transfer). Aerojet. $500	No Activities. $0	No Activities. $0
	No Activities. $0	Conduct research to develop comprehensive technology base for heat transfer processes. Perform experimental and theoretical research to enhance specific understanding of heat transfer in energy conservation technologies. Efforts would be basis for a coordinated National Heat Transfer Research Program. $800	No Activities. $0
Advanced Conversion Technology	Continue fluid dynamics, thermodynamics, and heat transfer research using Reversing Flow Test Facility (RFTF). ANL	Continue studies at Reversing Flow Test Facility (RFTF). Incorporate experimental results into Stirling Engine Analysis Module and Optimization routine.	Close-out Activities. $100
	Continue development of isothermal compressor concept for power cycles. University of Dayton	Complete research on isothermal compressor concept for power cycles.	No Activities.

III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
			$0
	Initiate direct conversion technology research to advance current state-of-the-art. JPL $629	Continue direct conversion technology research to advance state-of-the-art of selected technologies, such as thermionics, alkali-metal devices, and thermoelectrics. Initiate activity to investigate new approaches to thermionic energy conversion. $200	No Activities. $0
	No Activities. $0	Initiate thermodynamic cycles and fluid systems applied research activity to provide technology base support for advanced energy conversion technology. $800	No Activities. $0
Subtotal Thermal Sciences	(TOA $1,129) BA $1,129	(TOA $1,800) BA $1,800	$100
Materials			
High-Temperature Materials	Continue investigation of mechanisms of increased temperature stability in nickel aluminide and initiate research on problems of weldability and hot formability. ORNL, U. of TN, NCSU, RPI, Columbia U. $1,067	Complete research on mechanisms of increased temperature stability in nickel aluminide and on the problems of weldability and hot forming. $1,000	Continue sample preparation for industry evaluation of nickel aluminide and other intermetallics. (Technology Transfer) $200
	Make ductile other members of the intermetallic family having potential for high-temperature stability (e.g., iron aluminides). ORNL, Lehigh U., Dartmouth U. $1,250	Continue research to make ductile other members of the intermetallic family. $1,200	Initiate property determination of new ductile intermetallics. $1,200
	Continue use of radio frequency radiation to join ceramic materials,	Continue experiments on use of radio frequency radiation to join	Complete experiments on use of radio frequency radiation to join

Program Activity	FY 1986	FY 1987	FY 1988
	both with and without brazing materials. DHR, ORNL, VPI & SU, LBL	ceramic/ceramic components.	ceramic/ceramic components.
	$500	$500	$500
	Initiate experimental verification of finite element mathematical models depicting the stresses in ceramic joints. Norton, ORNL, Ga. Tech., Univ Energy Sys, Northwestern U.	Continue experimental verification of finite element computer models of stresses in ceramic joints.	Complete experimental verification of finite element computer models of stresses in ceramic joints.
	$507	$700	$700
	No Activities.	Initiate research on surface modification of ceramic materials as a means of toughening their surfaces.	Continue research on surface modification of ceramic materials with emphasis on experiments to achieve toughening of ceramic surfaces.
	$0	$200	$500
	No Activities.	No Activities.	Initiate planning to explore ceramics other than the "Big 4" (Aluminum oxide, zirconium oxide, silicon carbide, silicon nitride).
	$0	$0	$100
Materials by Design	Continue research on correlating the bonding and structure of selected materials by use of experimental and theoretical computational tools with the objective of designing desired properties into materials through use of knowledge of their atomic structure and bonding. LANL, ORNL, VPI & SU	Continue research on correlating the bonding and structure of selected materials using both experimental and computational tools.	Continue research on correlating the bonding and structure of selected materials using both experimental and computational tools. Conduct competitive solicitation to involve research community other than national labs in materials-by-design concept.
	$1,000	$1,000	$1,000
	Initiate studies of bonding in metal clusters as a model for nickel aluminides in order to be able to predict the micro-alloying technique to use to make any given intermetallic compound ductile. U. of Florida, Carnegie-Mellon U., Univ. of London, LANL	Continue studies of bonding in metal clusters. This is done to be able to predict the micro-alloying technique to use to make an intermetallic compound ductile.	Continue studies of bonding in metal clusters. Determine the effect of electron correlation in bonding of transition metal clusters.

III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	$396	$500	$500
Lightweight Materials	Continue preliminary experiments and planning for competitive solicitation on depolymerization of automobile plastic scrap for possible reforming and reuse. PIA, Brooklyn Poly, ORNL	Initiate contracts from RFP on depolymerization of plastics.	Continue experiments on depolymerization of automobile plastic scrap for possible reforming and reuse.
	$500	$800	$500
	Initiate investigations on use of the heat of polmerization reactions to save energy in the molding process (reactive polymer processing). Pitt, SERI	Continue investigation on the use of the heat of polymerization reactions to save energy in the molding process (reactive polymer processing).	Complete investigations of reactive polymer processing.
	$300	$300	$300
Corrosion-Resistant Materials	Stretch out exploratory experiments to identify new, corrosion-resistant magnesium alloys.	Complete exploratory experiments to identify new corrosion-resistant materials.	No Activities.
	$131	$200	$0
	(TOA $5,651) BA	(TOA $6,400) BA	
Subtotal Materials	$5,651	$6,400	$5,500
Catalysis/ Biocatalysis			
Bioprocess Engineering	Continue genetic information stabilization research. Cal Tech, JPL	Complete research on stabilization of genetic information in recombinant micro-organisms.	No Activities.
	$200	$200	$0
	Conduct research on novel bioreactor concepts, which may make it economically feasible to produce chemicals such as butanol with a biocatalyzed process. Battelle, Celanese, Cornell, U. of Colorado, U. Cal. Berkeley, ORNL, Chem Systems	Continue research contracts for novel bioreactor concepts.	Continue the third year of research contracts for novel bioreactor concepts.

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III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	$2,260	$2,200	$2,250
	Initiate planning for direct use of enzymes, which could eliminate the energy used to maintain the metabolic processes of living organisms in biochemical production processes. MIT	No Activities.	No Activities.
	$118	$0	$0
Catalysis-By Design	Continue research on catalysis-by-design through experimental characterization and theoretical mathematical modeling of biocatalytic systems. Cal Tech.	No Activities.	No Activities.
	$74	$0	$0
	No Activities.	Initiate modeling to predict enzyme structures.	Continue modeling to predict enzyme structures.
	$0	$258	$250
	No Activities.	Conduct research to design a catalyst/based on mathematical modeling.	No Activities.
	$0	$350	$0
Applied Microbiology	No Activities.	Conduct research to genetically engineer high-productivity micro-organisms.	No Activities.
	$0	$250	$0
Bioseparations	No Activities.	Conduct research to bio-recover phosphorous from low-grade ore.	No Activities.
	$0	$200	$0
	No Activities.	Conduct research to develop anti-fouling membranes.	No Activities.
	$0	$100	$0
	(TOA $2,652)	(TOA $3,558)	

III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Subtotal Catalysis/ Biocatalysis	BA $2,652	BA $3,558	$2,500
Tribology			
Lubricants	Use model compounds to determine the exact parameters that control lubricity.	Complete development of mathematical model that correlates molecular structure with lubricant qualities, and transfer research to lubricant-additive industry.	No Activities.
	$275	$200	$0
	Continue research at the National Bureau of Standards on high-temperature solid lubricants and include U.S. Air Force research on high-temperature liquid lubricants.	Continue research on high-temperature liquid and solid lubricants. Emphasis on liquid lubricants will be placed on the piston-ring pack/cylinder liner interface, which is where the highest temperatures occur in a heat engine. In addition to engine start-up, liquids are necessary here in order to cool the engine and to remove wear debris. Research on solid lubricants will also continue in order to ensure that all tribological systems in advanced engines will have lubrication as needed. Coordinate work with DARPA, DOE/Transportation Systems, and NASA programs.	Continue research at NBS and selected subcontractors on high-temperature (600 degrees C) lubricants.
	$350	$350	$400
	Complete research at Pennsylvania State University on lubricants for warm forming of metals.	No Activities.	No Activities.
	$150	$0	$0
	Complete research at Pennsylvania State University on lubricants delivered from the gas phase.	Conduct RFP on additional novel lubricant delivery techniques, such as lubricant stick transfer and liquid-solid lubricant suspensions.	Continue research on additional novel lubricant delivery techniques with contractor(s) selected from RFP.
	$80	$250	$300

Program Activity	FY 1986	FY 1987	FY 1988
	Continue development of advanced analytical lubricant measurement techniques at the National Bureau of Standards. $170	Continue development of advanced analytical lubricant measurement techniques, such as laser micro-Raman in-situ analysis technique for studying the wear of lubricant films. This in-situ technique provides real-time information on how lubricant bonds are formed and broken during wear at high temperatures. $350	Continue research to develop advanced analytical lubricant measurement techniques that monitor lubricating film under sliding wear conditions. $200
	Complete research on modeling of energy efficient-gears at Northwestern University. $50	Initiate development of computer model at Northwestern University that determines how new, low friction and wear lubricant species identified at NBS would perform in a small-scale, two-disc gear simulator as compared to conventional lubricants. Significant energy savings would then be possible because friction and wear losses in automotive transmissions would be greatly reduced. $150	Continue research on spur-gear model and interaction with lubricant. $150
	No Activities. $0	No Activities. $0	Conduct RFP on additives tailored for low-wear, low-friction ceramic piston rings and cylinder liners. These additives will be designed to prevent the formation of acid resulting from sulfur impurities in ashless deposits and would provide improved performance in engines. $150
Mechanisms of Friction and Wear	Conduct friction and wear studies at Oak Ridge National Laboratory of monolithic ceramic composites above 600 C. Share results with DARPA, DOE/Transportation Systems, and NASA. $200	Continue study of friction and wear of ceramic composites under conditions simulating those of advanced heat engines and high-speed machinery. $200	Continue to conduct research in friction and wear of ceramic composites at ORNL. $125
	Continue research at Georgia Tech on	Apply model of thermal effects of	No Activities.

III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	mechanisms of wear of unlubricated ceramics.	unlubricated sliding wear of ceramics at Georgia Tech to ceramic wear results.	
	$100	$100	$0
	Continue first phase of X-ray and surface wear studies by Virginia Polytechnical Institute and State University (VPI) at Brookhaven National Laboratory National Synchrotron Light Source.	Complete research at VPI using carryover funding ($77 carryover).	No Activities.
	$100	$0	$0
	Complete thermochemical model development of ceramics at Oak Ridge National Laboratory.	No Activities.	No Activities.
	$100	$0	$0
	No Activities.	Initiate techniques at Oak Ridge National Laboratory to develop TIB2-TIC-C system or TIB2 with vapor phase reaction of TICl2, BCl3 and H2 to study how to provide a source of lubricious carbon to the interfacial region of ceramics and ceramic composites.	Continue research on TIB2 at ORNL.
	$0	$250	$125
Friction and Wear Testing	Initiate development of tests specific to ceramics at National Bureau of Standards. Development of standardized tests enables data to be compared and also allows correlation with field data at greatly reduced cost.	Complete development of standardized wear test procedure at NBS for four-ball wear tester.	No Activities.
	$100	$100	$0
	Conduct assessment by National Bureau of Standards and Oak Ridge National Laboratory of ceramic wear test devices.	No Activities.	No Activities.
	$90	$0	$0

III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Tribological Surface Modifications and Coatings	Expand FY 1985 efforts with "quartet" (ANL, UCLA, MIT, and Borg-Warner) on experiments to develop advanced tribological coatings for application in transportation, metalworking, and agricultural machinery. Begin mathematical model development.	Complete "quartet" experiments to develop well-characterized tribological surface modification techniques. Complete mathematical modeling to explain how cutting tool steels chemically dissolve under use. This effort will provide the framework for surface modification research applicable to both metalworking and transportation sectors.	No Activities.
	$1,290	$750	$0
	No Activities.	Initiate modeling at ANL to describe development of hard cubic-BN coatings on metals.	Complete modeling effort on cubic BN and initiate experiments to verify models. Cubic BN is the hardest substance after diamond and could serve as a possible substitute for diamond where wear resistance is important.
	$0	$150	$350
	No Activities.	No Activities.	Initiate research on crystalline diamond films in order to understand their tribological mechanisms and in conjunction with Transportation Systems, apply results to engine parts.
	$0	$0	$200
	Continue research at Lawrence Livermore Laboratory on anti-abrasion, wear-resistant coatings.	Complete research at Lawrence Livermore Laboratory on anti-abrasion, wear-resistant coatings.	No Activities.
	$150	$150	$0
Tribological Design Tools	Develop long-range feasibility, cost, and implementation plan for a computerized state-of-the-art tribological data retrieval system. Begin implementation of evaluated numeric data module. Obtain cost-sharing agreements with industry and professional societies. (This reduces Government cost and automatically enhances technology transfer). NBS, DOE/OSTI, LANL, USAF,	Initiate Phase 1 effort in which the Government Steering Committee (DOE, NBS, NSF, and USAF) funds: design module in cooperation with ASME; numeric data in conjunction with ASLE and other technical societies; and bibliographic data base in cooperation with Canadian and West German governments.	Begin second phase in which all six modules (design data, evaluated numeric data, bibliographic data, research in progress, who's who, and product directory) are supported by Government and private sector funding. Initiate implementation of plan to phase out Government support.

III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	NSF		
	$450	$300	$300
	Initiate development by Compu-Tec Engineering, Inc., of a computer model that describes the frictional behavior of piston-rings in distorted cylinder bores. ($50 in new BA, $75 in carryover).	Complete computer model that describes frictional behavior of piston rings, and transfer to the private sector, using unexpended balances. This model will assist industry in reducing frictional losses in internal combustion and compression ignition engines.	No Activities.
	$50	$150	$0
	Complete development by SKF of computer model that can be used to design mechanical systems in which microtopography or mocrogeometric effects play a critical role. Jointly funded by ECUT and BES.	No Activities.	No Activities.
	$75	$0	$0
	No Activities.	Initiate development of cooperative Government- Industry-university project to integrate fatigue life theory for bearings with the latest advances in lubricant formulation, surface modification, ceramic finishing methods, and contact models. This team lead by SKF, uses a model previously developed under ECUT and BES funding. Other team members are ORNL, ANL, and University of Michigan. Successful completion of this research would enable a model to be used to rank materials, predict wear transitions, and perhaps most importantly develop innovative concepts for performace improvements.	Continue project to integrate fatigue life theory with latest advances in lubricant formulation, surface modification, ceramic finishing methods, and contact models. Begin validation of models, and initiate research on surface treatments.
	$0	$150	$200
	(TOA $3,855) BA	(TOA $3,677) BA	

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III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Subtotal Tribology	$3,780	$3,600	$2,500
International Research Monitoring	Initiate investigation by Pacific Northwest Laboratory of foreign conservation technology. $140	Continue limited investigation of foreign conservation technology research. ($100 in new BA and $68 in carryover.) $100	Continue investigation of foreign conservation technology research. Initiate development of foreign technology reference series by country. Focus on energy conservation-related technology areas. Initial research focuses on Japan. $100
Subtotal International Research Monitoring	(TOA $140) BA $140	(TOA $168) BA $100	$100
Conservation Program Analysis and Planning	No Activities. $0	Conduct analyses and review of conservation program and update Conservation Five Year Plan. $100	Conduct extensive update of Conservation Five Year Plan. $100
Subtotal Conservation Program Analysis and Planning	(TOA $0) BA $0	(TOA $100) BA $100	$100

III. Energy Conversion and Utilization Technologies (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Innovative Concepts Program	In cooperation with the Inventions Program, conduct assessment of needed energy inventions ($300 in unobligated carryover). $0	Program supported by Inventions and Innovation Program. $0	Program supported by Inventions and Innovation Program. $0
Subtotal Innovative Concepts Program	(TOA $300) BA $0	(TOA $0) BA $0	$0
Subtotal ECUT Operating Expenses	(TOA $18,702) BA $18,327	(TOA $20,503) BA $20,358	$15,800

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

MULTI-SECTOR

I. Preface: Inventions and Innovation

The mission of the Energy-Related Inventions Program (ERIP) is to evaluate energy-related inventions and new concepts offered by the public and to provide assistance to the most promising. The Innovative Concepts Program conducts solicitations on carefully targeted energy conservation opportunities in order to assist the end-use conservation research programs in ferreting out revolutionary research concepts.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Inventors Evaluations	$1,600	$1,850	$1,310	-29
Inventors Assistance	2,895	2,850	1,930	-32
Innovative Concepts	210	300	50	-83
Total, Energy-Related Inventions Program	$4,705	$5,000	$3,290	-34

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory	$0	$100	$100	0
Oak Ridge National Laboratory	$200	$75	$50	-33
Pacific Northwest Laboratory	$350	$125	$50	-60

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Invention Evaluations	Evaluate 1400 invention proposals. Conduct 6 National Innovation Workshops. ($1600 new BA, $250 carryover)	Perform technical evaluation of 1,000 invention disclosures. Conduct 6 National Innovation Workshops and support 4 Commercialization Workshops for inventors selected to participate in the program.	Perform technical evaluation of 900 of 1,200 invention disclosures submitted. Conduct 4 National Innovation Workshops and support 3 Commercialization Planning Workshops for inventors participating in the program.
	$1,600	$1,850	$1,310
Inventors Assistance	Provide support for 34 inventors. ($2,561 in new BA, $589 in carryover)	Provide technical development grant support for a maximum of 34 inventors. Provide non-financial assistance to	Provide technical development grant support for a maximum of 24 inventors. Provide non-financial assistance to

III. Inventions and Innovation (cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
		those for whom grant funding is not available. ($2,200 in new BA and $145 in carryover)	those for whom grant funding is not available.
	$2,561	$2,200	$1,540
	Conduct program evaluation, planning and support tasks.	Conduct program evaluation and planning activities. Monitor the performance of 40 grants in progress. Support invention-related initiatives in 6 states.	Conduct program evaluation and planning activities. Monitor the performance of 20 grants in progress. Support activities of the innovative technology community.
	$334	$650	$390
Innovative Concepts Program	Conduct assessment of needed energy inventions.	Conduct competitive solicitation in innovative energy conversion devices.	Complete prior years' efforts.
	$210	$300	$50
Subtotal Inventions and Innovations	(TOA $5,544) BA $4,705	(TOA $5,145) BA $5,000	$3,290

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

MULTI-SECTOR

I. Preface: NATAS

The mission of the National Appropriate Technology Assistance Service (NATAS) is to provide information and consultation assistance to the public requesting self-help in solving energy problems.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Total, National Appropriate Technology Assistance Service	$1,426	$1,400	$700	-50

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
National Appropriate Technology Assistance Service			
NATAS	Provide individual engineering, scientific and technical responses to questions and information requests posed by individual homeowners, small businesses, farmers, state and local governments and non-profit institutions. Answers relate to those technologies that lend themselves to self-help, usually those technologies that utilize sun, wind and water resources and yield savings due to conservation methods and devices: a total of 8,500 replies to requests for information anticipated in fiscal year 1986. Energy fact sheets are being	Provide individual engineering, scientific and technical responses to questions and information requests posed by individual homeowners, small businesses, farmers, state and local governments and non-profit institutions. Answers relate to those technologies that lend themselves to self-help, usually those technologies that utilize sun, wind and water resources and yield savings due to conservation methods and devices. Promotional efforts are encouraged at workshops and conferences. Efforts to assist local governments are being	Provide individual engineering, scientific and technical responses to questions and information requests posed by individual homeowners, small businesses, farmers, state and local governments and non-profit institutions. Answers relate to those technologies that lend themselves to self-help, usually those technologies that utilize sun, wind and water resources and yield savings due to conservation methods and devices. Would probably be able to respond to 6,000 inquiries.

III. NATAS (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	developed to be used to respond to some of the questions NATAS is most frequently asked. Includes $222 unobligated carryover.	increased. Technical and business development are emphasized. A total of 10,000 replies to requests for information is anticipated in FY 1987. FY1987 BA is $1,400 and unobligated carryover is $520.	
	$1,428	$1,400	$700
	(TOA $1,650)	(TOA $1,920)	
Subtotal NATAS	$1,428	$1,400	$700

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

MULTI-SECTOR

I. Preface: Capital Equipment

Funds will be used to continue upgrading of outmoded equipment and the acquisition of new state-of-the-art equipment for the ECUT Program at the DOE national laboratories and at Historically Black Colleges and Universities (HBCU's) conducting ECUT research.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, Capital Equipment	$952	$1,000	$127	-87

II. B. Major Laboratory and Facility Funding

Argonne National Laboratory..................................	$225	$180	$0	-100
Oak Ridge National Laboratory................................	$263	$300	$77	-74
Sandia Laboratories..	$115	$250	$0	-100
Lawrence Berkeley Laboratory.................................	$20	$0	$0	0

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Capital Equipment	Continue upgrading of equipment at national laboratories, and provide equipment to HBCU's. ($952 new BA, plus $20 in prior year funds). $952	Continue updating and upgrading of equipment at National Laboratories, other Federal facilities and educational institutions ($74 carryover) $1,000	Provide instrumentation for materials research. $127
	(TOA $972) BA	(TOA $1,074) BA	
Subtotal Capital Equipment	$952	$1,000	$127

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

MULTI-SECTOR

I. Preface: Program Direction

The requested funding will provide salaries, benefits and travel for a staff of 8 FTE's to manage the ECUT and inventions programs.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, Multi-Sector Program Direction	$510	$546	$489	-10

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Program Direction	Provide funding for 6 FTEs for ECUT. $510	Provide funding for 9 FTEs for ECUT. $546	Provide funding for 8 FTEs for ECUT and inventions programs. $489
Subtotal Program Direction	(TOA $510) BA $510	(TOA $546) BA $546	$489
Total Multi-Sector	(TOA $27,378) BA $25,922	(TOA $29,188) BA $28,304	$20,406

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY CONSERVATION
(dollars in thousands)

OBJECT CLASS

Multi-Sector

Direct Funding:	FY1986 Actual	FY1987 Estimates	FY1988 Estimates
11.0 Personnel Compensation:			
11.1 Full-time permament	$417	$398	$358
11.3 Other than full-time Permanent	0	0	0
11.5 Other Personnel Compensation	21	20	18
11.9 Total Personnel Compensation	438	418	376
12.1 Personnel benefits	46	44	39
13.0 Benefits for former personnel	0	0	0
21.0 Travel and Transportation of Persons	14	82	72
25.0 Other Services	24,472	26,760	19,792
31.0 Capital Equipment	952	1,000	127
32.0 Lands and Structures	0	0	0
41.0 Grants, subsidies, and contributions	0	0	0
Totals	$25,922	$28,304	$20,406

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION

OVERVIEW

State and Local Assistance Programs

The goal of the State and Local Assistance Programs is to encourage energy conservation initiatives on the state and local level through a mix of activities and programs, including direct financial assistance, personalized information services, technical assistance, and developmental demonstration projects to enhance state and private sector involvement in energy conservation. The Office of State and Local Assistance Programs administers the following programs in support of its goal:

- The Weatherization Assistance Program;
- The Schools and Hospitals Grants Program, also known as the Institutional Conservation Program;
- The Energy Policy and Conservation Act (EPCA) Grants, also known as the State Energy Conservation Program (SECP); and
- The Energy Extension Service.

The first two programs were established to provide assistance to sectors of the economy which experience particular difficulty in dealing with rising energy costs. The Weatherization Assistance Program increases the energy efficiency of residences occupied by low-income citizens across the country, particularly the homes of the elderly and the handicapped. The Schools and Hospitals Grants Program provides matching grants to non-profit institutions. The EPCA Grants and the Energy Extension Service were established to provide funding to the States and Territories for a variety of comprehensive energy conservation activities, and to build a capacity within and among the States and Territories to plan, develop, and carryout their own energy conservation and outreach programs.

These programs have accomplished a great deal. Over 1.7 million low-income homes have been weatherized. Over 20,000 grants have been awarded to schools and hospitals, funding energy conservation projects in some 57,000 institutional buildings. Comprehensive energy conservation programs and information outreach programs are in place in 57 States and Territories, and through these millions of people have been aided in using energy more efficiently.

In FY 1987 the majority of appropriated funds in Program direction ($13,500,000) will be used for the oversight and monitoring of state use of funds received from settlement of the Exxon and Stripper Well petroleum pricing violation cases. Appropriated funds ($65,933,329) provided for direct grant activities are proposed for rescission because they are unnecessary in light of the large amounts of monies available to states for these activities as a result of the settlement of petroleum pricing violations cases. In addition, $134,066,670 is available for program activities from the Petroleum Violation Escrow Account under the terms of the Petroleum Overcharge Distribution and Restitution Act of 1986 (PODRA).

No Federal funding is requested for grant activities in FY 1988. Federal funds requested for program direction will provide for closeout of prior year Federal grants and oversight and monitoring of Exxon and Stripper Well oil overcharge funds distributed to the states.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION
(dollars in thousands)

LEAD TABLE

State and Local Assistance Programs

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Weatherization BA	$182,084	$ 64,615[1]	$ 64,615	$ 0	-$64,615
Schools and Hospitals BA	44,888	1,319[2]	1,319	0	- 1,319
EPCA Grants BA	17,903	0	0	0	0
Energy Extension Service BA	7,466	0	0	0	0
Territories Assistance BA	476	0	0	0	0
Program Direction BA	9,745	13,500	13,500	6,000	- 7,500
Total State and Local Assistance Programs	$262,562	$79,434[3]	$79,434	$ 6,000	-$73,434
Staffing Total FTE	173	180	180	125	- 55

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[1] Includes a pending rescission of $64,614,663.
[2] Includes a pending rescission of $1,318,666.
[3] In FY 1987, $134,066,670 is available for program activities from the Petroleum Violation Escrow Account under the terms of the Petroleum Overcharge Distribution and Restitution Act of 1986 (PODRA).

LEAD TABLE

State and Local Assistance Programs (Cont.)

Authorizations:

- P.L. 95-39, National Energy Extension Service Act, Title V
- P.L. 94-163, Energy Policy and Conservation Grant Program (Energy Policy and Conservation Act)
- P.L. 95-385, Energy Conservation and Production Grant Program (Energy Conservation and Production Act)
- P.L. 95-619, Schools and Hospitals Grants Program (National Energy Conservation Policy Act, Sec. 301-304)
- P.L. 95-619, Other Local Government Buildings Grants Program (National Energy Conservation Policy Act, Sec. 310-312
- P.L. 94-358, Weatherization Assistance Program (Energy Conservation and Production Act, Sec. 411)
- P.L. 95-91, Department of Energy Organization Act (Development Act of 1974)
- P.L. 95-91, Department of Energy Organization Act, Sec. 301

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION
(dollars in thousands)

SUMMARY OF CHANGES

State and Local Assistance Programs

FY 1987 Appropriation enacted	$ 79,434
Adjustment - Proposed Rescission	-65,934
FY 1988 Base	$ 13,500
Program Direction	
- -55 FTE and grants monitoring reductions	-7,500
FY 1988 Congressional Budget Request	$ 6,000

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

STATE AND LOCAL ASSISTANCE PROGRAMS

I. Preface: Weatherization Assistance Programs

The Weatherization Assistance Program increases the energy efficiency of residences occupied by low-income citizens across the country, particularly the homes of the elderly and the handicapped.

It is estimated that approximately 14.4 million households at or below 125% of the poverty level are eligible to receive assistance under this program. Low-income households are least able to respond effectively to the market signal of higher prices by making energy conservation investments. Through FY 1986, approximately 1.7 million low-income homes were weatherized under this program.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Total, Weatherization Assistance Programs......................	$182,084	$64,615	$0	-100

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
Weatherization Assistance Program	Continue program support activities. Develop series of "lessons learned" to transfer successful program operation strategies to program grantees. Issue program opportunity grants to State and local agencies to promote energy-related business development activities by local agencies. Develop transition program strategy to optimize program delivery given limited Federal funds. Increase support for innovative financing initiative. Continue quality control and client education activities. Weatherize 183,000 homes.	Continue training and technical assistance activities. Continue program monitoring. Continue weatherization strategy to optimize program delivery in view of further reduction in federal funds. Continue consumer education and innovative financing initiatives. Weatherize approximately 62,500 low-income homes. $ 64,615 is proposed for rescission. Total obligational authority of $65,609 reflects $64,615 BA and $994 in FY1986 unobligated carryover.	No new grant activities.

III. Weatherization Assistance Program (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	Total obligational authority of $186,699 reflects $182,084 BA, $4,752 in prior year funds and deferral of $137 in prior year funds.		
	$182,084	$64,615	$0
	(TOA $186,699)	(TOA $65,609)	
Subtotal Weatherization Assistance Program	BA $182,084	BA $64,615	$0

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

STATE AND LOCAL ASSISTANCE PROGRAMS

I. Preface: Schools and Hospitals

The Schools and Hospitals Grant Program was established to encourage energy conservation initiatives in the institutional building sector. Such public and private non-profit institutions use significant amounts of energy, the cost of which represents a large proportion of their operating budgets. As a result, energy conservation measures can result in significant energy and economic savings.

Through FY 1986, the program awarded over 20,000 grants for energy conservation projects in over 57,000 school and hospital buildings. The program has also had notable secondary effects in stimulating energy-saving activities and developing expertise in energy conservation in participating institutions.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Total, Schools and Hospitals..................................	$44,888	$1,319	$0	-100

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
Schools and Hospitals	Continue activities begun in FY 1985. Implement program strategy, using a portion of appropriation for developmental grants to States to assist non-profit institutions to gain access to alternative information, expertise, and financing sources for energy conservation projects. Prepare case studies based on these activities to assist States in planning similar activities. Award 1454 grants covering 3635 buildings. Total obligational authority of $59,172 reflects $44,888 in new BA and $14,284	Continue program strategy efforts to aid states in assisting institutions to access alternate sources of information expertise, and funding for program activities. Award approximately 429 grants covering 1,073 buildings. $1,319 is proposed for rescission. Total obligational authority of $15,069 reflects $1,319 BA and $13,750 in FY1986 unobligated carryover.	No new grant activities.

III. Schools and Hospitals (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	in prior year funds. $44,888	$1,319	$0
Subtotal Schools and Hospitals	(TOA $59,172) BA $44,888	(TOA $15,069) BA $1,319	$0

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

STATE AND LOCAL ASSISTANCE PROGRAMS

I. Preface: EPCA Grants

The EPCA Grants, more commonly referred to as the State Energy Conservation Program (SECP), provides states with the means to plan, establish and implement energy conservation programs that reduce energy consumption in each state. Fifty states, D.C., and 6 territories have developed energy efficiency plans, and are implementing and evaluating specific programs.

SECP supports the states in the development of conservation and renewable resources activities that address the specific energy issues of each state. The states have also developed and are maintaining an energy emergency planning and response network, a database of information on energy use and energy conservation efforts statewide, and state-wide "networks" of organizations involved in energy activities.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, EPCA..	$17,903	$0	$0	0

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
EPCA Grants	Continue to provide grants to 50 States, D.C. and 6 territories to continue their best energy efficiency programs. Work with States to increase program planning, evaluation, and financing skills. Total obligational authority $18,273 includes $17,903 in new BA and $370 in prior year funds for EPCA grants.	No new grant activities.	No new grant activities.
	$17,903	$0	$0

III. EFCA Grants (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	(TOA $18,273)	(TOA $0)	
Subtotal EFCA Grants	BA $17,903	BA $0	$0

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

STATE AND LOCAL ASSISTANCE PROGRAMS

I. Preface: Energy Extension Service

Through the States the Energy Extension Service provides tailored information, and technical assistance to small scale energy users (i.e. small businesses, local governments and homeowners) to help them decide what are their most effective and productive energy conservation and renewable energy options.

The demonstration of commercially available technologies/techniques, hands-on workshops, on-site technical assistance and "how-to" workbooks are the principal methods utilized by EES to meet the needs of the energy consumer. EES has functioned as an integrating and coordinating mechanism for existing resources and delivery mechanisms, providing them with new/updated information and backing them with sound technical advice. EES has also provided a referral service to assist energy consumers.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, Energy Extension Service................................	$7,466	$0	$0	0

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
Energy Extension Service	Continue to provide grants to 50 States, D.C. and 6 territories to continue their best energy efficiency outreach programs. Work with States in increase program planning, evaluation and financing and skills. Total obligational authority of $7,622 includes $7,466 in new BA and $156 in prior year funds.	No new grant activities.	No new grant activities.
	$7,466	$0	$0

III. Energy Extension Service (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	(TOA $7,622)	(TOA $0)	
Subtotal Energy Extension Service	BA $7,466	BA $0	$0

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

STATE AND LOCAL ASSISTANCE PROGRAMS

I. Preface: Territories Assistance

DOE provides small grants to Territories to aid them in developing their indigenous energy resources, as an alternative to conventional energy sources which must be imported to the islands.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, Territories Assistance..................................	$476	$0	$0	0

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
Territories Assistance	Initiate provision of small grants to the Territories to aid them in developing their indigenous energy resources.	No Activities.	No Activities.
	$476	$0	$0
	(TOA $476)	(TOA $0)	
Subtotal Territories Assistance	BA $476	BA $0	$0

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

STATE AND LOCAL ASSISTANCE PROGRAMS

I. Preface: Program Evaluation

Program Evaluation funds have been used to evaluate energy savings and other impacts of the State and Local Assistance Programs.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	$ Change
Total, Program Evaluation......................................	$0	$0	$0	0

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
Program Evaluation	Continue activities begun in FY 1985. ($855 unobligated carryover) $0	Complete activities begun in FY 1985. (funds made available from unexpended balances) $0	No Activities. $0
Subtotal Program Evaluation	(TOA $855) BA $0	(TOA $0) BA $0	$0

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DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

STATE AND LOCAL ASSISTANCE PROGRAMS

I. Preface: Program Direction

The staffing level for State and Local Assistance Programs in FY 1988 is 125 FTE. This FTE level will support personnel in headquarters and in DOE's field offices to provide monitoring and oversight of activities carried out under the SLAP grant programs. Program direction funds will also be used for contractor support as required to provide support for the analysis, evaluation and technical assistance activities of the office. These activities include evaluation of energy conservation measures and they apply to the grant programs, transfer of program information and technologies between and among states to improve the operation and efficiency of the grant programs, and for technical assistance to grantees. This staffing level will also provide the resources necessary to fulfill the Department's responsibility to oversee and monitor state use of petroleum overcharge funds.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Total, State and Local Program Direction.......................	$9,745	$13,500	$6,000	-56

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
Program Direction	Provide salaries and expenses for 173 FTE at headquarters and field offices. Evaluate programs. Decrease monitoring.	Provide salaries and expenses for 180 FTE at headquarters & DOE field offices for activities described above.	Provide salaries and expenses for 125 FTE at headquarters and DOE field offices, for grant close-out activities, and to provide limited technical assistance to grantees. Also provide resources to monitor and oversee state use of petroleum overcharge funds.
	$9,745	$13,500	$6,000

III. Program Direction (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Subtotal Program Direction	(TOA $9,745) BA $9,745	(TOA $13,500) BA $13,500	$6,000
Total State and Local Assistance Programs	(TOA $282,842) BA $262,562	(TOA $94,178) BA $79,434 *	$6,000

---

* $65,933,329 is proposed for recission in the Weatherization and Schools and Hospitals grant programs. The recission amounts are $64,614,663 and $1,318,666 respectively.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY CONSERVATION
(dollars in thousands)

OBJECT CLASS

State & Local Assistance Programs

Direct Funding:	FY1986 Actual	FY1987 Estimates	FY1988 Estimates
11.0 Personnel Compensation:			
11.1 Full-time permament	$7,663	$7,746	$5,158
11.3 Other than full-time Permanent	0	0	0
11.5 Other Personnel Compensation	383	387	258
11.9 Total Personnel Compensation	8,046	8,133	5,416
12.1 Personnel benefits	843	852	584
13.0 Benefits for former personnel	0	0	0
21.0 Travel and Transportation of Persons	636	862	0
25.0 Other Services	220	3,653	0
31.0 Capital Equipment	0	0	0
32.0 Lands and Structures	0	0	0
41.0 Grants, subsidies, and contributions	252,817	65,934	0
Totals	$262,562	$ 79,434	$6,000

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION
(dollars in thousands)

LEAD TABLE

Policy and Management

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Policy and Management Conservation Operating Expenses	$ 1,726	$ 1,862	$ 1,862	$ 1,662	-$ 200
Total Policy and Management Conservation	$ 1,726	$ 1,862	$ 1,862	$ 1,662	-$ 200
Staffing Total FTE	25	21	21	17	- 4

Authorization:
o P.L. 95-91, "Department of Energy Organization Act", Section 20

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
ENERGY CONSERVATION
(dollars in thousands)

SUMMARY OF CHANGES

Policy and Management

FY 1987 Appropriation enacted	$ 1,862
Adjustments	0
FY 1988 Base	1,862
A reduction of 4 FTEs	-200
FY 1988 Congressional Budget Request	$ 1,662

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
CONSERVATION AND RENEWABLE ENERGY
(dollars in thousands)

KEY ACTIVITY SUMMARY

POLICY AND MANAGEMENT - EC

I. Preface: Policy and Management-Energy Conservation

Staffing levels provide the executive and overall program direction for all CE programs to ensure effective management. These activities include executive management, policy formulation, program review and approval, and liaison with senior officials in DOE, White House, Congressional, OMB, other Departmental Agencies, private industry, and State and local governments. In addition, the staff will carry out analyses of the CE programs needed to assess performance and effectiveness.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Policy and Management-Energy Conservation Operating Expenses ...	$1,726	$1,862	$1,662	-11
Total, Policy and Management EC................................	$1,726	$1,862	$1,662	-11

II. B. Major Laboratory and Facility Funding

Non-Applicable

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
Policy and Management	Policy and Management provides overall management guidance to Conservation and Renewable Energy (CE) programs. Provides 25 FTEs for liaison with senior officials in DOE, Congress, the White House, OMB and other Agencies as well as state and local governments. Provides analyses of CE programs needed to assess performance and effectiveness.	Policy and Management provides overall management guidance to Conservation and Renewable Energy (CE) programs. Provides 21 FTEs for liaison with senior officials in DOE, Congress, the White House, OMB and other Agencies as well as state and local governments. Provides analyses of CE programs needed to assess performance and effectiveness.	Policy and Management provides overall management guidance to Conservation and Renewable Energy (CE) programs. Provides 17 FTEs for liaison with senior officials in DOE, Congress, the White House, OMB and other Agencies as well as state and local governments. Provides analyses of CE programs needed to assess performance and effectiveness.

III. Policy and Management--Energy Conservation (Cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
	Contract support to assist in CE wide planning, policy development, program planning and evaluation, budget formulation and execution, personnel management and administrative support.	Contract support to assist in CE wide planning, policy development, program planning and evaluation, budget formulation and execution, personnel management and administrative support.	Provides for contract support to assist in CE wide planning, policy development, program planning and evaluation, budget formulation and execution, personnel management and administrative support.
	$1,726	$1,862	$1,662
	(TOA $1,726) BA	(TOA $1,862) BA	
Total Policy and Management--Energy Conservation	$1,726	$1,862	$1,662

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY CONSERVATION
(dollars in thousands)

OBJECT CLASS

Policy & Management

Direct Funding:	FY1986 Actual	FY1987 Estimates	FY1988 Estimates
11.0 Personnel Compensation:			
11.1 Full-time permament	$693	$706	$580
11.3 Other than full-time Permanent	0	0	0
11.5 Other Personnel Compensation	35	35	29
11.9 Total Personnel Compensation	728	741	609
12.1 Personnel benefits	76	78	64
13.0 Benefits for former personnel	0	0	0
21.0 Travel and Transportation of Persons	281	110	207
25.0 Other Services	641	933	782
31.0 Capital Equipment	0	0	0
32.0 Lands and Structures	0	0	0
41.0 Grants, subsidies, and contributions	0	0	0
Totals	$1,726	$1,862	$1,662

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY CONSERVATION
(dollars in thousands)

OBJECT CLASS

Facilities

Direct Funding:	FY1986 Actual	FY1987 Estimates	FY1988 Estimates
11.0 Personnel Compensation:			
11.1 Full-time permament	$0	$0	$0
11.3 Other than full-time Permanent	0	0	0
11.5 Other Personnel Compensation	0	0	0
11.9 Total Personnel Compensation	0	0	0
12.1 Personnel benefits	0	0	0
13.0 Benefits for former personnel	0	0	0
21.0 Travel and Transportation of Persons	0	0	0
25.0 Other Services	0	0	0
31.0 Capital Equipment	0	0	0
32.0 Lands and Structures	9,830	10,000	0
41.0 Grants, subsidies, and contributions	0	0	0
Totals	$9,830	$10,000	$0

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

STRATEGIC PETROLEUM RESERVE

VOLUME 4

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SPR PETROLEUM ACCOUNT

For the acquisition and transportation of petroleum and for other necessary expenses under section 167 of the Energy Policy and Conservation Act of 1975 (Public Law 94-163), as amended by the Omnibus Budget Reconciliation Act of 1981 (Public Law 97-35), $127,744,000, to remain available until expended: Provided, That notwithstanding 42 U.S.C. 6240(c) and 6240(d), as amended by Public Law 99-509, the minimum average annual required fill rate during fiscal year 1988 shall be not less than 35,000 barrels per day: Provided further, that notwithstanding 42 U.S.C. 6240(d), portions of the United States share of crude oil in Naval Petroleum Reserve numbered 1 (Elk Hills) may be sold or otherwise disposed of to other than the Strategic Petroleum Reserve.

Explanation of Change

Proposed Language lowers the fill rate requirements for the Strategic Petroleum Reserve and eliminates the requirements for a shut-in of the Naval Petroleum Reserve if the fill rate is not maintained.

STRATEGIC PETROLEUM RESERVE

For expenses necessary to carry out the provisions of sections 151 through 166 of the Energy Policy and Conservation Act of 1975 (Public Law 94-163), [$147,433,000], $142,437,000, to remain available until expended. (Department of the Interior and Related Agencies Appropriations Act, 1987, as included in Public Laws 99-500 and 99-591, section 101(h).)

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

STRATEGIC PETROLEUM RESERVE

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Request
Strategic Petroleum Reserve	$ 378,217	$ 147,433	$ 142,437
Less Use of Prior Year Balances and Other Adjustments	-270,684	---	---
Subtotal, SPR	107,533	147,433	142,437
SPR Petroleum Account	---	---	127,744
Total, Strategic Petroleum Reserve .	$ 107,533	$ 147,433	$ 270,181

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
STRATEGIC PETROLEUM RESERVE
(dollars in thousands)

AMOUNTS AVAILABLE FOR OBLIGATION

	FY 1987	FY 1988
Appropriation, Strategic Petroleum Reserve	$ 147,433	$ 142,437
Appropriation, SPR Petroleum Account	---	127,744
Subtotal, Budget Authority	$ 147,433	$ 270,181
Unobligated Balances, Start of Year	640,372	115,948
Unobligated Balances, End of Year	-115,948	---
Total, Obligations	$671,857	$ 386,129

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
STRATEGIC PETROLEUM RESERVE
(dollars in thousands)

RESOURCES AND OBLIGATIONS PLANS
FY 1987 AND FY 1988

	Unobligated Balances 10/1/86	FY 1987 Appropriation	Total FY 1987 Resources	Planned FY 1987 Obligations	Unobligated Balances 9/30/87	Proposed FY 1988 Reprogram.	Balances After Reprogram.	Planned FY 1988 Obligations	FY 1988 Request
Strategic Petroleum Reserve Account									
Storage Facilities Development and Operations									
Phase I	$ ---	$ ---	$ ---	$ ---	$ ---	$ ---	$ ---	$ ---	---
Phase II	7,136	---	7,136	7,136	---	---	---	---	---
Phase III	49,864	---	49,864	39,265	10,599	-10,599	---	---	---
Non-Phase Specific	53,466	134,021	187,487	177,189	10,298	+10,599	20,897	150,995	130,098
Subtotal	$ 110,466	$ 134,021	$ 244,487	$ 223,590	$ 20,897	$ ---	$ 20,897	$ 150,995	$130,098
Management	4,318	13,412	17,730	15,826	1,904	---	1,904	14,243	12,339
Total Strategic Petroleum Reserve Account	$ 114,784	$ 147,433	$ 262,217	$ 239,416	$ 22,801	$ ---	$ 22,801	$ 165,238	$142,437
SPR Petroleum Account	525,588	---	525,588	432,441	93,147	---	93,147	220,891	127,744
Total SPR Program	$ 640,372	$ 147,433	$ 787,805	$ 671,857	$ 115,948	$ ---	$ 115,948	$ 386,129	$270,181

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
STRATEGIC PETROLEUM RESERVE

OVERVIEW

STRATEGIC PETROLEUM RESERVE

The Strategic Petroleum Reserve (SPR) was created to maintain adequate strategic and economic protection against oil supply disruptions. It moderates the economic impacts of oil price increases and supply shortages, reduces the pressures for allocation and price controls in the event of a supply disruption, reduces the likelihood of panic buying and provides more time for diplomacy to work in special situations.

Current Administration policy is to continue to support the goal of a 750 million-barrel SPR in a fiscally responsible manner and to urge other oil consuming nations to take similar actions in developing strategic stockpiles.

The FY 1988 Department of Energy request supports this policy through the following measures:

-- Completion of storage facilities construction at the Big Hill and Bayou Choctaw sites in FY 1988.

-- Commencement of solution mining of the final cavern at Bayou Choctaw in FY 1987.

-- Continued solution mining at Bryan Mound and West Hackberry until the available storage capacity of the SPR reaches approximately 580 million barrels.

-- Fill of the SPR at an average rate of 35,000 barrels per day in FY 1988 to achieve a cumulative fill of approximately 547 million barrels.

-- Policy of advance ordering approximately 3 months of subsequent year oil deliveries, beginning in FY 1987.

-- Continuation of capital improvements program to upgrade fire protection, site security, safety and systems reliability.

-- Completion of pipeline from Bryan Mound to Texas City, Texas and associated terminal enhancements in FY 1987 to increase distribution capability of the Seaway complex from 0.39 to 1.10 million barrels per day.

- Commencement of design, land acquisition and long-lead equipment procurement in FY 1987 for a pipeline from West Hackberry to Lake Charles, Louisiana and initiation of pipeline construction and associated terminal enhancements in FY 1988 to increase the distribution capability of the Texoma complex from 1.20 to 1.40 million barrels per day, commensurate with site drawdown capability.

- Commencement of Capline complex enhancements in FY 1987 with work continuing in FY 1988 to increase Capline distribution capability from 0.83 to 1.07 million barrels per day, commensurate with site drawdown capability.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
STRATEGIC PETROLEUM RESERVE
(dollars in thousands)

LEAD TABLE

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Strategic Petroleum Reserve Account					
Storage Facilities Development and Operations					
Phase I - existing sites	$ ---	$ ---	$ ---	$ ---	$ ---
Phase II - expansion sites	---	---	---	---	---
Phase III - new sites	156,414	---	---	---	---
Non-phase Specific	206,140	134,021	134,021	130,098	-3,923
Subtotal	362,554	134,021	134,021	130,098	-3,923
Management	15,663	13,412	13,412	12,339	-1,073
Subtotal	378,217	147,433	147,433	142,437	-4,996
Use of Prior Year Balances ...	-270,684	---	---	---	---
Total Strategic Petroleum Reserve Account	$107,533	147,433	147,433	142,437	-4,996
SPR Petroleum Account	---	---	---	127,744	+127,744
Total SPR program	$107,533	$147,433	$147,433	$270,181	+122,748
Staffing (FTEs)	152	147	147	142	- 5

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
STRATEGIC PETROLEUM RESERVE
(dollars in thousands)

SUMMARY OF CHANGES

FY 1987 Appropriation Enacted	$147,433
FY 1988 Base	$147,433
Storage Facilities Development and Operations	
° Non-phase Specific	
- Decreases resulting from proposed reprogramming of excess construction funds from Phase III:	
-- Operations	-2,275
-- Distribution Enhancements	-3,379
- Other Increases and Decreases:	
-- Capital Improvements - Increase due to backlog of unfunded fire protection, safety, security and reliability projects	+2,767
-- Distribution Enhancements - Decrease due to completion of funding (through proposed reprogramming) of planned projects to achieve a distribution capability of 3.5 million barrels per day	-1,036
Management	
- Decrease resulting from an underutilization of funding available in FY 1987 for support services. This is because there are not requirements in FY 1987 for all of the support services funds which were deferred until late FY 1986 and carried over to FY 1987	-1,073
Oil Acquisition and Transportation	
- Increase due to FY 1987 oil fill being fully funded from SPR Petroleum Account funds carried over from FY 1986	+127,744
FY 1988 Congressional Budget Request	$270,181

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DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
STRATEGIC PETROLEUM RESERVE
(dollars in thousands)

KEY ACTIVITY SUMMARY

STRATEGIC PETROLEUM RESERVE ACCOUNT

I. Preface: Storage Facilities Development and Operations and Management

Storage Facilities Development and Operations funds all requirements associated with providing facilities for the storage of crude oil, the capability for placing oil into storage and the capability for drawing down and distributing the oil in the event of an emergency. The currently planned capacity of the Strategic Petroleum Reserve is 750 million barrels (MMB), being developed in three phases. Phase I, completed in 1980, consists of 260 MMB of capacity at five underground storage sites and a Federally-owned marine terminal at St. James, Louisiana. Phase I storage sites include Bryan Mound in Texas and West Hackberry, Bayou Choctaw, Sulphur Mines and Weeks Island, all in Louisiana. Phase II entails the expansion of the Bryan Mound, West Hackberry and Bayou Choctaw sites to provide an additional 290 MMB of capacity. Phase III involves the expansion of these same three sites by a total of 60 MMB, plus the development of a 140 MMB site at Big Hill, Texas. Requirements not directly associated with the facilities for specific phases are funded in the Non-phase Specific category of the Storage Facilities Development and Operations budget.

Management funds all costs of Strategic Petroleum Reserve personnel, the administrative expenses related to maintaining the Project Management Office in New Orleans, Louisiana, and the contract services required to support management and the technical analysis of program issues.

II. A. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Phase I	$ ---	$ ---	$ ---	---
Phase II	2,304	7,136	---	-100
Phase III	111,331	39,265	---	-100
Non-phase Specific	172,986	177,189	150,995	- 15
Subtotal	$286,621	$223,590	$150,995	- 32
Management	13,229	15,826	14,243	- 10
Subtotal	$299,850	$239,416	$165,238	- 31
Use of Prior Year Balances	-192,317	- 91,983	- 22,801	
Total Strategic Petroleum Reserve Account	$107,533	$147,433	$142,437	- 3

B. Major Laboratory and Facility Funding

Sandia National Laboratory	$ 2,110	$ 125	---	-100

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Phase I	No activity	No activity	No activity
Phase II	Commenced construction of infrastructure required to prepare Bayou Choctaw Cavern 17 for oil fill. Continued other ongoing miscellaneous Phase II construction. Obligations of $2,304.	Complete Bayou Choctaw Cavern 17 infrastructure and other miscellaneous Phase II construction. Obligations of $7,136.	No activity
Phase III	Commenced new construction at Big Hill, including the raw water and brine lines (Stage 1C), Stage 2 surface facilities and the crude oil pipeline. Also commenced new construction for Bayou Choctaw Cavern 101 and completed miscellaneous Phase III construction at Bryan Mound and West Hackberry. Obligations of $111,331.	Complete Stage 1C of Big Hill construction, along with the crude oil pipeline; continue with Stage 2 construction and commence construction of the site operations building and security system (Stage 2S). Complete construction for Bayou Choctaw Cavern 101, except for the Physical Protection and Control Room Integration Systems. Obligations of $39,265.	Complete construction at Big Hill and Bayou Choctaw. Obligations of $0.
Non-phase Specific	Maintained operational readiness of existing systems and structures. Leached at Bryan Mound and West Hackberry through December 1985 and resumed in July 1986. Initiated enhancements at Bryan Mound to increase sweet crude drawdown capability and reduce site vulnerability and risk associated with Cavern 5 storage/drawdown. Supported ongoing and new construction efforts. Initiated repairs to West Hackberry brine disposal line. Continued oil fill to a level of 506.4 MMB. Provided security force and equipment to protect and maintain integrity of all sites. Continued environmental activities in compliance with applicable regulations and permits. Obligations of $116.015.	Continue operational readiness maintenance and construction support activities. Complete brine disposal line repairs and continue West Hackberry leaching. Complete leaching and Cavern 5 enhancements at Bryan Mound; commence leaching at Bayou Choctaw. Continue oil fill at Bryan Mound, West Hackberry and Bayou Choctaw to achieve at total fill level of approximately 534 MMB. Continue site security and environmental monitoring activities. Obligations of $132,077.	Continue operational readiness maintenance and construction support activities. Suspend leaching program when available storage capacity reaches approximately 580 MMB. Continue oil fill to a level of approximately 547 MMB, utilizing available capacity at Bryan Mound, West Hackberry, and Bayou Choctaw. Continue site security program and environmental monitoring activities. Obligations of $116,039.

Program Activity	FY 1986	FY 1987	FY 1988
Non-phase Specific (continued)	Continued on-going Capital Improvements program with resources directed primarily to security systems at Bryan Mound, West Hackberry, Weeks Island and St. James. Obligations of $18,492.	Continue implementation of Capital Improvements program, focusing mainly on deluge fire protection systems at Bryan Mound and St. James and Category III fire protection tasks at Bayou Choctaw. Obligations of $19,229.	Continue implementation of Capital Improvements program with major projects to include emergency shutdown valves at cavern wellheads at Bryan Mound, West Hackberry, and Bayou Choctaw, a deluge fire protection system at Weeks Island and Category III fire protection tasks at West Hackberry. Obligations of $21,279.
	Continued with Distribution Enhancements program, including commencement of construction of the Bryan Mound to Texas City pipeline and modifications to the ARCO marine terminal. Also completed environmental assessment and planning for Lake Charles pipeline. Obligations of $38,479.	Complete construction of Bryan Mound to Texas City pipeline and ARCO terminal modifications and commence Phillips terminal modifications. Commence design, land acquisition and LLE procurement for Lake Charles pipeline, and construction of the Capline terminal connection. Obligations of $25,883.	Commence construction of Lake Charles pipeline and award contracts for additional marine distribution capability at Lake Charles and St. James. Complete Capline terminal connection. Obligations of $13,677.
Subtotal, Storage Facilities	$286,621	$223,590	$150,995
Management	Provided analytic support for SPR development, fill and distribution policy decision. Reinitiated procurements and managed new construction for Big Hill and Bayou Choctaw. Managed leaching operations at West Hackberry and initiated and managed Bryan Mound storage configuration enhancements program. Managed Capital Improvements, Distribution Enhancements and SPR security programs. Supported and oversaw activities of MOM contractor and subcontractors in maintaining operational readiness at storage sites. Implemented	Provide analytic support for SPR development, fill and distribution policy decisions. Continue management of new construction for Big Hill and Bayou Choctaw. Manage leaching operations at West Hackberry and Bayou Choctaw and continue management of Bryan Mound storage configuration enhancements program. Continue management of Capital Improvements, Distribution Enhancements and Security programs. Continue support and oversight of MOM contractor and subcontractor activities. Procure and	Provide analytic support for SPR development, fill and distribution policy decisions. Continue to manage new construction at Big Hill and Bayou Choctaw to completion in mid - to late FY 1988. Manage the preparation of Big Hill for leaching BY 1989, if directed. Continue management of Capital Improvements, Distribution Enhancements, and Security Programs. Continue support and oversight of MOM contractor and subcontractor activities. Procure and manage injection of approximately 13 MMB of oil. Continue oil quality

Management (continued)	FY 1986	FY 1987	FY 1988
	and managed the test sale of 1 MMB of SPR oil. Procured approximately 18 MMB of oil and managed its injection into the SPR. Managed oil quality assurance program. Obligations of $13,229.	manage injection of approximately 27 MMB of oil. Continue oil quality assurance management activities. Obligations of $15,826.	assurance management activities. Obligations of $14,243.
Subtotal, Strategic Petroleum Reserve Account	$299,850	$239,416	$165,238
Use of Prior year Balances	-192,317	- 91,983	- 22,801 1/
Total, Strategic Petroleum Reserve Account	$107,533	$147,433	$142,437

1/ Includes $10,599 savings on Phase III construction which result from the award of the Big Hill Stage 2 construction and the crude oil pipeline contracts at less than budget estimates. These savings are proposed for reprogramming to Non-phase Specific in FY 1988.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
STRATEGIC PETROLEUM RESERVE
(dollars in thousands)

KEY ACTIVITY SUMMARY

SPR PETROLEUM ACCOUNT

I. Preface: Oil Acquisition and Transportation

The SPR Petroleum Account was established in the Treasury pursuant to the provisions of Omnibus Budget Reconciliation Act of 1981 (P.L. 97-35). This Account funds all Strategic Petroleum Reserve oil procurements, associated transportation costs, U.S. Customs duties, terminal throughput charges and other related miscellaneous costs, such as Defense Fuel Supply Center administration costs associated with the acquisition and transportation of oil for the Reserve.

II. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Oil Acquisition and Transportation	$171,491	$432,441	$220,891	-49
Use of Prior Year Balances	-171,491	-432,441	- 93,147	
Total SPR Petroleum Account	$ ---	$ ---	$127,744	

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Oil Acquisition and Transportation	Filled the SPR to a level of 506.4 MMB and advanced ordered an additional 1.6 MMB for delivery in FY 1987. Obligations of $171,491.	Fill the SPR at 75 MMB/D, increasing the inventory by 27.4 MMB to a level of approximately 534 MMB, and advance order approximately 3 months of FY 1988 deliveries at 35 MB/D. Obligations of $432,441	Fill the SPR at 35 MB/D to a level of approximately 561 MMB and advance order approximately 3 months of FY 1989 deliveries at 35 MB/D. Obligations of $220,891.
Subtotal, SPR Petroleum Account	$171,491	$432,441	$220,891
Use of Prior Year Balances	-171,491	-432,441	- 93,147
Total, SPR Petroleum Account	---	---	$127,744

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
STRATEGIC PETROLEUM RESERVE
(dollars in thousands)

OBJECT CLASS

Direct Obligations:	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
11.1 Full-time permanent	$ 5,902	$ 6,902	$ 6,997
11.3 Other than full-time permanent	264	221	229
11.5 Other personnel compensation	115	128	132
Total personnel compensation	$ 6,281	$ 7,251	$ 7,358
12.1 Personnel benefits: Civilian	$ 731	$ 1,055	$ 933
21.1 Travel and transportation of persons	468	752	813
22.0 Transportation of things	17	47	49
23.0 Communication, utilities, and other rent	0	690	1,026
24.0 Printing and reproduction	1	10	11
25.0 Other services	469,843	662,041	375,902
26.0 Supplies and materials	0	11	37
Total obligations	$477,341	$671,857	$386,129

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
STRATEGIC PETROLEUM RESERVE
(dollars in thousands)

CONTRACTOR LIST

Storage Facilities Development Operations	Amount
° Operations & Operations Support	
- Boeing Petroleum Services	$ 92,094
- General Services Administration	8,848
- SMS	5,475
- Sandia	125
- Walk, Haydel and Associates	519
- Other/To be determined	8,978
Subtotal	$116,039
° Capital Improvements	
- Walk, Haydel and Associates	$ 4,691
- Boeing Petroleum Services	2,826
- Other/To be determined	13,762
Subtotal	$ 21,279
° Distribution Enhancements	
- Phillips Petroleum	$ 79
- Sun Marine Terminal	413
- Other/To be determined	13,185
Subtotal	$ 13,677
Total, Storage Facilities Development and Operations	$150,995
Management	
- Analytic Support Services - Headquarters	$ 3,451
- Field Office support - rent, utilities, miscellaneous	1,689
- Other/staff salaries and expenses	9,104
Subtotal	$ 14,243
Total Facilities Development Operations and Management	$165.238

CONTRACTOR LIST (continued)

	Estimated Amount
Petroleum Acquisition and Transportation	
- To be determined	$220,891
Total Strategic Petroleum Reserve Program	$386,129

EMERGENCY PREPAREDNESS

For necessary expenses in carrying out emergency preparedness activities, [$6,044,000,] $6,206,000, to remain available until expended. (Department of Interior and Related Agencies Appropriations Act, 1987, as included in Public Laws 99-500 and 99-591, section 101(h).)

Explanation of Change

The current one-year appropriation potentially jeopardizes the readiness requirement to have Federal staff available, by the potential shutdown of operations as a result of failure to receive appropriations at the beginning of each fiscal year.

Additionally, the current one year appropriation has impeded the effective utilization of contract support by restricting the use of available funds to a twelve month period. Current competitive procurement procedures require considerable lead time for awarding contracts.

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

EMERGENCY PREPAREDNESS

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Request
Energy Emergencies	$ 5,750	$ 6,044	$ 6,206
Total, Emergency Preparedness	$ 5,750	$ 6,044	$ 6,205

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
EMERGENCY PREPAREDNESS

OVERVIEW

Energy Emergencies

The goal of the Administration's energy policy -- to ensure an adequate supply of energy to the country at reasonable cost -- is supported by three main objectives: energy stability, security, and strength. The National Energy Policy Plan defines energy stability as a condition "in which problems of energy availability and price do not destabilize the U.S. economy or our way of life." Energy security means, among other things, that the U.S. is less vulnerable to energy disruptions and able to handle disruptions should they occur. Energy strength results from energy stability and energy security. To help achieve these objectives, the Emergency Preparedness Program seeks to:

- reduce the Nation's vulnerability to energy supply disruptions; and
- enhance our ability to respond should a disruption occur.

The U.S. likely will remain vulnerable to energy supply disruptions throughout this decade, and beyond. However, by securing U.S. energy resources against potential threats -- including disruptions in world oil supplies, acts of hostile governments, terrorism, sabotage, and natural disasters -- the Nation can assure energy supplies for defense, vital domestic needs, and international obligations, while moderating adverse effects on the economy.

The Administration's emergency preparedness strategy relies on a free market to respond to energy contingencies, supported by government policies, programs, and procedures for:

- using the Strategic Petroleum Reserve (SPR);
- fulfilling commitments to the International Energy Agency (IEA), the North Atlantic Treaty Organization (NATO), and other allies;
- assuring Congress, states, localities, and the public of timely, accurate information, analyses and assessments about an energy emergency as it develops;

- coordinating Federal energy policies with states, localities and industry during an energy emergency;

- ensuring that the Nation has sufficient energy supplies to meet defense and other vital national needs during peacetime and mobilization periods;

- ensuring that U.S. energy emergency responses, should they be necessary, are based on the best possible assessment of the energy situation;

- ensuring response readiness through contingency plan development, training and exercises including participation in IEA, NATO and other civilian and military exercises; and

- ensuring the performance of the Department's essential functions in the event of war.

The Emergency Preparedness Program provides the Department with a cadre of trained professionals with institutional knowledge and experience in critical energy resources (i.e., petroleum, natural gas, electricity, and coal), industry operations, market analysis, and national security affairs, and crisis management. They are supported by the latest analytical tools, and in an energy emergency, this cadre can be augmented by other Departmental staff and interagency efforts.

In previous years, the Emergency Preparedness Program had focused largely on development of free market-based energy emergency response policies, procedures, and data analytic capabilities to meet threats posed by international oil supply disruptions (as characterized by the 1973 and 1979 oil supply disruptions). Over the last several years, the radicalization of various foreign ideologically-based movements has led to a realization that the U.S. must be better prepared for possible foreign or domestic sabotage, terrorism, or other disruption to the Nation's energy supplies, systems, and facilities. In addition, there is increasing emphasis on national security preparedness with particular focus on national mobilization for war or threats of war.

While the Department will continue efforts to closely monitor international oil supply developments as well as continue activities to provide for effective use of the Strategic Petroleum Reserve as a key element of energy emergency preparedness, the Program will also emphasize emergency response policy and capability development through:

- analyzing actual or prospective disruptions to energy systems and possible responses to such assessments;

- assessing national security and other critical energy needs, and how best to meet these needs;

- identifying and assessing plausible threats to energy systems security, and evaluating alternative measures to respond to, preempt, or mitigate the impacts of these threats;
- fulfilling statutory requirements, Presidential Executive Orders, National Security Decision Directives, Federal Preparedness Circulars, and other official taskings to ensure energy security; and
- carrying out National Security Council directives to ensure that energy security policies (e.g., National Security Decision Directive - 188) are met.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
EMERGENCY PREPAREDNESS
(dollars in thousands)

LEAD TABLE

Energy Emergencies

	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request versus Base
Program Direction:					
Operating Expenses......	$4,405	$5,226	$5,226	$5,388	+3
Subtotal.............	$4,405	$5,226	$5,226	$5,388	+3
Emergency Planning:					
Operating Expenses......	$ 819	$ 450	$ 450	$ 450	-
Subtotal.............	$ 819	$ 450	$ 450	$ 450	-
Emergency Operations:					
Operating Expenses......	$ 526	$ 368	$ 368	$ 368	-
Subtotal.............	$ 526	$ 368	$ 368	$ 368	-
Total:					
Operating Expenses......	$5,750	$6,044	$6,044	$6,206	+3
Emergency Preparedness..	$5,750	$6,044	$6,044	$6,206	+3
Staffing Total FTEs	64	71	71	71	

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
EMERGENCY PREPAREDNESS
(dollars in thousands)

SUMMARY OF CHANGES

Energy Emergencies

FY 1987 Appropriation enacted/FY 1988 Base	$ 6,044
Increased administrative overhead support	+ 162
FY 1988 Congressional Budget	$ 6,206

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
EMERGENCY PREPAREDNESS
(dollars in thousands)

KEY ACTIVITY SUMMARY

Energy Emergencies

I. Preface: Program Direction

The Energy Emergency Preparedness Program is directed toward the fulfillment of 5 major program areas that focus on Key Assessments, International, Mobilization, Management and Domestic activities. Energy emergency key assessments include studies, analyses and evaluations of systems and response options undertaken to ensure that Administration policies and programs continue to meet the energy policy goal of an adequate energy supply at a reasonable cost, in periods of either normalcy or energy disruptions. International energy emergency activities support energy security and strength through involvement in international programs that foster cooperative responses to international energy disruptions or allied energy requirements. Energy emergency mobilization activities support energy security and strength by contributing to defense preparedness, in conjunction with the National Security Council, the Department of Defense, and the Federal Emergency Management Agency. Emergency management activities contribute to the overall objectives of energy stability, security and strength by providing organizational structures and procedures and management support systems to respond to an energy emergency. Domestic energy emergency activities contribute to energy security by assessing the vulnerability of domestic energy systems to man-made or natural disruptions, improving communications among all responsible groups in the event of an emergency affecting the Nation's energy supplies, and ensuring the continuity of Government operations in time of war. In addition, Program Direction includes administrative overhead cost for rent, utilities and administrative services, and EIA data support.

II. Summary Table

Program Activity	FY 1986		FY 1987		FY 1988		% $ Change
Energy Emergency Key Assessments..........	4 FTE	$ 201	4 FTE	$ 228	4 FTE	$ 228	0%
Energy Emergencies International............	13 FTE	655	14 FTE	798	12 FTE	684	-14%
Energy Emergencies Mobilization.............	8 FTE	403	7 FTE	399	8 FTE	456	+14%
Emergency Management.......	14 FTE	705	16 FTE	912	17 FTE	969	+ 6%
Energy Emergencies Domestic.................	32 FTE	1,612	30 FTE	1,710	30 FTE	1,710	0%
Subtotal Program Direction................	71 FTE	$3,576	71 FTE	$4,047	71 FTE	$4,047	0%
Administration Overhead Cost		$ 829		$1,079		$1,241	+15%
EIA Support (OMB A-130)....		$ 0		$ 100		$ 100	0%
Total, Program Direction		$4,405		$5,226		$5,388	+ 3%

III. Program Direction

Program Activity	FY 1986	FY 1987	FY 1988
Energy Emergency Key Assessments	In response to Congressional interest and a GAO recommendation, conducted policy analysis of alternative contracts for use in selling SPR oil, including call-options contracts and forward sales contracts. Examined the implications of the recent growth in the use of netback contracts in international crude oil markets and on crude oil stocks. Developed a systematic means of assessing future SPR sales cycle options.	Plan and conduct a comprehensive Department-wide test of the Energy Emergency Management System decision process, SPR operational functions through multiple sales cycles, and SPR sales and drawdown policies. Based on analyses performed in FY 86, augment and improve existing management information systems to integrate SPR operational information with methods of presentation appropriate for managememt decisionmaking. Based on FY 86 analysis of alternative SPR sales contracts, make adjustments to SPR sales procedures and to the Standard Sales Provisions. Based on the FY 86 findings from the study of netback contracts, analyze the implications for SPR drawdown and sales policies. Modify policies and procedures, as appropriate.	Based on the results of the FY 87 simulation exercise and changes in oil market conditions, evaluate the need for further enhancements to SPR policies and/or procedures.
	Continued assessments of, inter alia, residual fuel oil market and data related to marine bunkering capabilities at major port facilities (requested by DOD); participation in National Petroleum Council (NPC) refinery study; and a review of services deemed "essential" by States and localities in past emergencies as a possible guide to the use of SPR directed sales.	Continue analysis of emergency response measures; participate in NPC study on U.S. oil and gas outlook; improve definition of a Minimum Operating Inventory (MOI) level for the petroleum industry; monitor and comment on NPC draft study reports on refinery flexibility.	Continue analyses of response measures reflecting changes in energy market conditions, Administration perspectives or State roles. Incorporate findings of NPC study on oil and gas outlook into emergency response analysis and response measures.

III. Program Direction (cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Energy Emergency Key Assessments (cont'd)	Developed issues and procedures affecting the drawdown of SPR oil: examined directed sales issues; explored Jones Act issues, and developed a basis for decision on Jones Act waiver alternatives; and performed an independent review of the mandated SPR test sale to assist the SPR Office in its report to Congress. (4 FTEs $201)	Refine SPR drawdown procedures by: developing DOE Emergency Management System directive, enhancing modelling capabilities of decision support system; concluding an agreement with the Federal Maritime Administration on Jones Act waivers; assessing availability of Jones Act and Construction Differential Subsidy (CDS) vessels. (4 FTEs $228)	Develop revised procedures resulting from issue recommendations, continue to explore new issues resulting from changing oil market conditions, test the data, scenario, and decision-support capabilities of the automated Decision Support System, conduct an interagency exercise of the procedures for waiving Jones Act requirements. (4 FTEs $228)
Energy Emergencies International	Continued U.S. representation before the IEA Standing Group on Emergency Questions. Participated in IEA AST-5 exercise. Supported stocks initiatives, including technical analyses of stock levels; continued U.S. representation before NATO Petroleum Planning Committee and its subgroups. Managed NATO Wartime Oil Organization (NWOO) activities, including training session for Joint Operational Staff, planning for NATO-wide exercise (WINTEX-CIMEX 87), participation in 1986 NWOO Training Session and recruitment of NWOO staff. (13 FTEs $655)	Continue technical support and U.S. representation before the IEA. Assist in development of detailed procedures to implement coordinated stock draw and plan for test of such procedures. Complete participation in the follow-up on lessons learned from AST-5. Coordinate NATO NWOO administration and logistics, including staff recruitment activities. Participate in WINTEX-CIMEX 87. (14 FTEs $798)	Continue technical support and U.S. representation before the IEA. Participate in proposed test of coordinated stock draw procedures and consider need for fine-tuning of such procedures and for further system improvements. Continue NATO NWOO coordination of administration and logistics activities. Plan for and conduct 1988 NWOO Training Session. (12 FTEs $684)

III. Program Direction (cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Energy Emergencies Mobilization	Supported NSC-mandated classified taskings, i.e., NSDD-134 and NSD-188, and NSDD-97 and NSDD-201 related to emergency communications. The impact of direct and indirect defense energy requirements was evaluated. Identified the possible energy bottlenecks and possible remedies. Reviewed alternative fuel sources and arrangements, including fuel switching and power wheeling.	Continue to support NSC-mandated classified taskings, i.e., NSDD-134 and NSDD-188, and NSDD-97 and NSDD-201 related to energy emergency communication requirements. Continue support of internal and interagency studies of defense energy needs. Improve analytic methods.	Continue to support NSC-mandated classified taskings, i.e., NSDD-134 and NSDD-188, and NSDD-97 and NSDD-201 related to energy emergency communication requirements. Continue support of internal and interagency development of reliable analytic procedures and data. Update procedures for adequate support of such studies.
	Participated in classified exercises with DoD to assure that DOE and National Defense Executive Reserve (NDER) personnel remain prepared for energy emergencies.	Continue participation and planning in domestic classified exercises. Use exercises for training, maintaining skills, exercising emergency programs and interagency coordination. Update and refine energy emergency preparedness measures.	Continue planning and participation in domestic classified exercises. Develop these exercises into a readiness assurance program for maximum quality assurance and training of DOE staff, consultants and NDER. Update and refine energy emergency preparedness measures and procedures as appropriate.
	Established procedures (Federal Energy Resource Management Manual) for administering energy priority ratings for purposes authorized by the Defense Production Act (DPA).	Explore use of interagency committee to assist in executing claimancy procedures (i.e., use of DPA authorities to respond to Federal Agency requests for energy resources), defining needs and related mobilization requirements. Explore merits of an outreach program to advise industry on Administration DPA policies and DOE/industry roles in meeting defense energy requirements. Explore mobilization issues and defense requirements. Participate in mobilization studies and conferences.	Refine procedures based on lessons learned from previous exercises and interagency deliberations; expand outreach program beyond National Defense Executive Reservists to advise industry on Administration DPA policies; participate in related defense mobilization activities (e.g., REX ALPHA and WINTEX exercises); maintain mobilization awareness.

III. Program Direction (cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Energy Emergencies Mobilization (cont'd)	Increased National Defense Executive Reserve (NDER) membership for DOE's three units by one-third -- to 105, up from 79. Restructured Emergency Solid Fuels Executive Reserve (ESFER). Developed recruiting materials, participated in a FEMA-sponsored conference, and brought selected reservists onto DIALCOM electronic mail system to facilitate rapid information exchange.	Recruit additional National Defense Executive Reservists to fill vacancies; seek to further increase net membership by at least 50. Integrate NDERs into Continuity of Government (COG sector Teams and coordinate with DOE field elements. Complete NDER handbooks. Train new members. Add new Reservists to Dialcom electronic mail system.	Recruit National Defense Executive Reservists to bring strength to about 250. Continue to integrate NDER personnel into Federal COG Sector Teams. Work with other Federal resource claimant agencies to integrate systems and procedures for energy elements of COG Teams and to claim resources from other Federal departments. Develop energy infrastuncture operation manuals. Hold regional training, for reservists from all 3 DOE units on sector concerns and assignments. Bring all Reservists and company emergency contacts onto Dialcom electronic mail system.
	(8 FTEs $403)	(7 FTEs $399)	(8 FTEs $456)
Emergency Management	Established a unified process (Energy Emergency Management System (EEMS)) for conducting Government preparation for and response to a wide range of potential energy emergencies (including highly classified projects). The System consists of four fuel/energy-specific teams, i.e., petroleum, natural gas, solid fuels, and electric power. The teams draw together analytical, data, policy and program experts in each of the energy areas to assess an emergency, prepare response options, and provide decisionmaking support to the Secretary.	Enhance the EEMS by developing more diverse scenarios to which the Government can be prepared to respond; by conducting exercises to test and refine its capabilities (e.g., the testing of a DOE-wide SPR decisionmaking and operational DIREX-87B); by identifying other Federal and industry sources and data/expertise and developing procedures for information sharing and coordinated crisis response. Support projects initiated through interagency efforts.	Fine-tune and maintain readiness and currency of Energy Emergency Management System by conducting tests and exercises. Update assumptions and procedures as energy markets change, and keep the teams functioning with staff members having appropriate expertise. Continue to support inter-agency efforts on energy vulnerability.

III. Program Direction (cont'd)

(The following paragraph is illustrative of activities in which all four emergency response teams are or will be engaged):

Program Activity	FY 1986	FY 1987	FY 1988
Emergency Management (cont'd)	Established Natural Gas Emergency Response Team (NGERT) drawing experts from DOE and other Federal Agencies related to analysis and data support, pipeline operations, legal/regulatory authorities, and external support and coordination. NAGERT will plan for and respond to natural gas emergencies.	Expand membership to include industry representatives and broader skill base (e.g., systems engineers, computer analysts); define scope of activities contemplated by law and Administration policy (e.g., emergency gas purchase authorizations, powerplant use prohibitions); identify functional and response capability impacts of the Natural Gas Policy Act Amendments (NGPAA); clarify emergency procedural relations with FERC, ERA, and the Office of Policy.	Refine and test response procedures through scenario development and intra-agency participation (e.g., FERC, ERA); regularly assess the impact on response capabilities of passage of the NGPAA and decontrol of wellhead prices; revise listing of candidate response measures based on tests, market conditions, or new policies; enhance outreach efforts to advise industry/associations of team structure, objectives, and shared emergency roles.
	Enhanced the automated Decision Support System (DSS) by creating a relational data base of the Organization for Economic Cooperation and Development data for use in simulating oil disruptions; by providing a capability for automatic updating of data as it becomes available from the Energy Information Administration (EIA).	Extend DSS data base systems to include domestic petroleum production, transportation, and inventory information updated on an annual, monthly, and weekly basis. Develop a prototype Energy Situation Analysis Report based on semi-annual classified energy market forecasts; and integrate internal/external energy data, information and modeling systems.	Extend the DSS by expanding the data base to include coal, electricity, natural gas, and nuclear power; by installing a comprehensive microcomputer-based network incorporating local, DOE, and interagency communications; and by enhancing management control and utilization of electronic mail and expert systems technology.
	Continued monitoring the energy situation here and abroad to assess possible energy emergencies, their impacts and required responses.	Continue monitoring the energy situation and potential energy risks. Develop risk analysis methods and data bases as needed. Update and improve emergency response measures as needed for additional energy emergency situations.	Continue monitoring the energy situation and complete development of risk analysis methods and supporting data systems. Develop the capability for energy components of Federal Sector COG Teams.
	(14 FTEs $705)	(16 FTEs $912)	(17 FTEs $969)

III. Program Direction (cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Energy Emergencies Domestic	Assessed the vulnerability of domestic energy systems, and analyzed how to counteract potential threats or mitigate their impacts including the vulnerability of a natural gas pipeline serving a major city, and a critical oil products' pipeline. Developed general agenda, program, and structure of the Interagency Group on Energy Vulnerability.	Extend energy supply system studies to an examination of energy vulnerability in the 1990's. Inform government executives and agencies, energy suppliers, and critical users about findings of vulnerability studies and how such information can help prevent or mitigate potential problems. Support continuing projects developed by Interagency Group.	Work closely with government agencies, energy suppliers, and critical energy users on energy supply vulnerability to prevent attacks on these systems and/or mitigate the impact of interruptions. Initiate additional case studies to support Interagency Group projects.
	(9 FTEs $453)	(9 FTEs $513)	(9 FTEs $513)
	Expanded external communication links, through the Dialcom electronic mail system, to enable communications among DOE headquarters, regions, States and selected reservists. Updated State emergency contacts directory. Expanded oil and gas company emergency contact system to inform DOE about emergency responses during non-mobilization emergencies. Reviewed National Catastrophic Earthquake Response Plan.	Continue, through the Dialcom electronic mail system and other data transfer means, external communication links among DOE headquarters, regions, States and NDER members. Update energy industry organization emergency contacts for non-mobilization emergencies. Enhance electronic data acquisition systems, including satellite source and microcomputer down load capability. Develop automated energy data graphs for key energy emergencies data. Enhance energy emergency data references and document control system.	Incorporate Dialcom system enhancements to provide more effective external and internal communications links among users. Continue to update state and energy industry organization emergency contacts for non-mobilization emergencies. Develop communications for remote (field) access to HQ electronic data sources including DOE CATCOM. Participate in governmentwide mobilization exercises. Refine further key energy concerns automated contact data base.
	(7 FTEs $353)	(7 FTEs $399)	(7 FTEs $399)

III. Program Direction (cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Energy Emergencies Domestic (cont'd)	Coordinated DOE participation in classified continuity of Government (COG) exercise, including field staff and National Defense Executive Reservists. Conducted COG orientation for DOE field staff. Coordinated essential emergency functions assignments to field offices and needed emergency communications. Refined Energy Facility Locator System so that relevant data are available for damage assessment. Identified reference and data requirements for DOE HQ COG Teams A and B. Developed inventory control system for these documents, files, etc. Planned and conducted special exercise to relocate DOE executives.	Develop DOE Headquarters and Regional COG Teams. Integrate National Defense Executive Reserve Program and COG program. Develop regional and alternate HQ COG team operating sites, including emergency communications requirements. Train COG Team in damage assessment, including blast and fallout effects. Plan and conduct DOE HQ executive relocation exercises. Identify and obtain reference, data files, etc., at DOE field COG sites.	Coordinate DOE HQ and field participation in classified readiness exercise. Plan and conduct DOE executive relocation exercise. Continue to recruit, train and otherwise maintain DOE HQ COG Teams and monitor field activities. Train COG Team to assess damages, including blast and fallout effects. Improve emergency communications for DOE HQ and Regional COG Team operating sites. Continue to update and refine references, files, etc., at DOE HQ and Field COG Team operating sites.
	(16 FTEs $806)	(14 FTEs $798)	(14 FTEs $798)
Total, Energy Emergencies Domestic	(32 FTEs $1,612)	(30 FTEs $1,710)	(30 FTEs $1,710)

III. Program Direction (cont'd)

Program Activity	FY 1986	FY 1987	FY 1988
Administrative Overhead Costs	Administrative overhead for supplies, materials, utilities, and services provided by MA centrally.	Provide for services described in FY 1986. Increase attributed to additional rent, utilities, and administrative services.	Provides for increased costs for rent and services. (Note: These increases cannot be absorbed without serious programmatic impacts. There are no additional contract funds from FY 1987 to FY 1988, and there is no allowance for inflation.)
	$829	$1,079	$1,241
EIA ADP Support	ADP support services provided by EIA, required to be reimbursed per OMB circular No. A-130. Charges to be incurred beginning in FY 1987. FY 1986 costs were absorbed from contract funds.	Estimated usage of EIA ADP support for energy emergency preparedness analytic capabiiites.	Same level of effort as anticipated in FY 1987.
	$0	$100	$100
Total Emergency Preparedness Program Direction	$4,405	$5,226	$5,388
Total FTEs	71	71	71

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
EMERGENCY PREPAREDNESS
(dollars in thousands)

KEY ACTIVITY SUMMARY

Energy Emergencies

I. Preface: Emergency Planning Contracts

Provides contract support to the Emergency Preparedness program in accordance with policies to maintain energy stability, security and strength, to reduce the Nation's vulnerability to energy supply disruptions and to enhance our ability to respond should a disruption occur. Under Emergency Planning, support services will be used to fulfill objectives of energy emergency response policy analysis and planning, promote international energy security, and serve to secure energy supplies to meet defense and other vital national needs during peacetime and mobilization periods.

II. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Emergency Planning........................	$ 819	$ 450	$ 450	0%

III. Emergency Planning Contracts

Program Activity	FY 1986	FY 1987	FY 1988
Emergency Planning Contracts	Support services for emergency preparedness test and exercise preparation and conduct, development of emergency management processes to augment in-house staff; tasks included design of data bases and reprogramming of Impact Simulator and Oil Disruption and Analysis Models to support policy situation analysis, and development of software for policy data base activities.	Continues support services for tests/exercise preparation and conduct, development of emergency management processes and situation analyses for FY87 tests, e.g., WINTEX/CIMEX NATO exercise and support for evaluation and follow-up. Tasks will focus on improving emergency management process for Energy Emergency Management System (EEMS) to evaluate support for effective decision-making.	Continues support for preparation and conduct of tests/exercises, refinement of emergency management processes (e.g., EEMS-related testing for response to specific emergencies by fuel type) and evaluations for all testing (e.g., SPR-related drawdown/distribution tests) and provides support for enhancement of data analytic capabilities in this area.
	($391 Contracts)	($200 Contracts)	($200 Contracts)
	Support services for classified energy security-related tasks to continue progress made in NSC Project 87 begun in late FY83. Tasks include modeling of defense energy requirements to support mobilization scenarios and analysis of energy emergency stock issues to support international energy security requirements under IEA agreements and initiatives.	Limited support for classified energy security projects, e.g., taskings regarding NSDD-188 implementation support, also continues modeling/simulation of defense energy requirements, and includes national security analyses required by FEMA Special Compartmented Programs.	Limited support for classified energy security projects with emphasis on NSDD-188 implementation, domestic energy security vulnerability-related issues, further analysis of defense energy requirements, and support for national security analyses for FEMA Special Compartmented Programs.
	($428 Contracts)	($250 Contracts)	($250 Contracts)
Total Emergency Planning Contracts	($819)	($450)	($450)

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
EMERGENCY PREPAREDNESS
(dollars in thousands)

KEY ACTIVITY SUMMARY

Energy Emergencies

I. **Preface: Emergency Operations Contracts**

Under Emergency Operations, support services will be used to promote preparedness activities associated with the Department's essential functions in the event of war and U.S. energy resources against potential threats including terrorism, sabotage, natural disasters and acts of hostile governments.

II. **Summary Table**

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Emergency Operations.......................	$ 526	$ 368	$ 386	0%

III. Emergency Operations Contracts

Program Activity	FY 1986	FY 1987	FY 1988
Emergency Operations Contracts	Funds for ADP services and support provided to the Emergency Preparedness Program by EIA. Includes maintenance support and services for EIA-provided hardware (office support systems, terminals), specialized computer programming support for national security projects (continuity of government and vulnerability activities), and data services (modeling, macro analytical tools). EIA-provided ADP hardware is used in tests/exercises to access electronic mail and process unclassified message traffic.	Provides EIA support, e.g., maintenance support and technical services for EIA-provided equipment, limited special programming assistance in performing national security projects (COG, domestic energy security activities), data services for modeling, impact analyses of classified scenarios or emerging threat conditions.	Provides EIA support, e.g., maintenance support and technical services for EIA-provided equipment, limited special programming assistance in performing national security projects, (COG, domestic energy security activities), data services for modeling and support of impact analyses of classified scenarios or emerging threat conditions.
	($250 Contracts)	($213 Contracts)	($213 Contracts)
	Funds for maintaining electronic mail communication service which supports DOE energy emergency public information activities with state & local governments, DOE Operations Offices, and key elements of the private sector, e.g., Department's Executive Reservists in energy emergencies.	Provides funds for maintaining electronic mail service to support information exchange with state & local governments, DOE Operations Offices, key elements of private sector, e.g., DOE Executive Reservists in energy emergencies and in conduct of unclassified exercises.	Provides funds at same level of effort for purposes as described in FY 1987.
	($80 Contracts)	($70 Contracts)	($70 Contracts)
	Funds for energy data base contractor support including commercial timesharing services used to provide data in lieu of Government data collections, software and hardware upgrades, e.g., analysis of automated office systems (AOSS) requirements, and support for data analytic capabilities which are required for FEMA Special Compartmented Programs.	Continues limited data base contractor support including timesharing services, software and hardware upgrades, support for AOSS requirements, support for data analytic capabilities required for FEMA Special Compartmented Programs.	Continues limited data base contractor support as described in FY 1987.
	($196 Contracts)	($85 Contracts)	($85 Contracts)
Total Emergency Operations Contracts	($526)	($368)	($368)

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
EMERGENCY PREPAREDNESS
(dollars in thousands)

OBJECT CLASS

Energy Emergencies

		FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Direct Obligations				
Personnel Compensation:				
11.1	Full-time permanent.........	$3,100	$3,442	$3,442
11.3	Other than full-time permanent.................	67	70	70
11.5	Other personnel compensation.............	75	40	40
11.9	Total personnel compensation.............	$3,242	$3,552	$3,552
12.1	Personnel Benefits: Civilian.................	330	345	345
21.0	Travel & transportation of persons...............	100	150	150
22.0	Transportation of things....	18	20	20
23.2	Communications, utilities, and other rent...........	490	678	782
24.0	Printing and reproduction.............	58	62	62
25.0	Other services.............	1,449	1,163	1,221
26.0	Supplies and materials......	63	74	74
	Total obligations	$5,750	$6,044	$6,206

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

ENERGY REGULATION

VOLUME 4

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ECONOMIC REGULATION

For necessary expenses in carrying out the activities of the Economic Regulatory Administration and the Office of Hearings and Appeals, [$23,400,000,] $21,680,000. (Department of the Interior and Related Agencies Appropriations Act, 1987, as included in Public Laws 99-500 and 99-591, section 101(h).)

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ENERGY REGULATION

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Request
Fuels Conversion	$ 1,142	$ 2,000	$ 587
Compliance	14,281	13,685	13,105
Natural Gas and Electricity	2,079	2,060	2,092
Program Administration	646	655	701
Office of Hearings and Appeals	5,275	5,000	5,195
Total, Energy Regulation	$23,423	$23,400	$21,680

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DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION

OVERVIEW

Economic Regulatory Administration

In FY 1988 the program goals of the Economic Regulatory Administration (ERA) include continuing resolution, by settlement or litigation, of the remaining cases of alleged pricing violations of the Emergency Petroleum Allocation Act of 1973 (EPAA); the authorization of the import and export of natural gas, the export of electricity, and the construction and operation of transmission facilities for exchanges of electricity across international borders; and the processing and issuance of prohibition orders for the conversion of existing oil and gas-fired powerplants to coal burning facilities. The budget request for ERA in FY 1988 is $16,485,000.

Compliance

The Compliance program administers the resolution of the enforcement activities that are the result of a wide spectrum of oil pricing and allocation regulations that governed the petroleum industry through most of the 1970's. Foremost among these was the EPAA which was in effect from October 1973 until January 1981. ERA, together with its predecessor organizations has audited approximately 20,000 petroleum firms, identifying approximately $8.2 billion in alleged oil overcharges, and has only about 350 cases remaining unresolved representing approximately $3 billion of alleged oil overcharge moneys remaining uncollected. At the end of 1986 the case development work was completed and the program now consists primarily of litigating and the negotiated settlement of enforcement cases previously developed.

By FY 1988 it is estimated that there will be about 200 cases remaining in ERA's case inventory with approximately $2 billion in alleged oil overcharges still to be collected. The program objectives in FY 1988 are to vigorously prosecute all overcharge violations through administrative or judicial tribunals and, when consistent with the public interest, resolve cases by negotiated settlements. The goals for FY 1988 are to resolve about one-third of the remaining cases and collect over $1 billion of the remaining uncollected alleged oil overcharge moneys.

In FY 1988 ERA will continue to pursue the successful completion of the Compliance program and the cases which remain from the EPAA pricing and allocation regulations. ERA will allocate resources on a priority basis, recognizing potential for litigation or settlement resolution and the magnitude of alleged violation. Cases will be pursued and, if not settled, vigorous litigation will follow until resolved. ERA is striving to bring to an end the vestiges of the price and allocations controls era and to bring about fair restitution to those overcharged by the violation of regulations.

To meet the goals of FY 1988, ERA will need an additional $300,000 in contract money for litigation support due the reduction of Compliance's FTE level from 170 to 150. This increase in contract money will enable ERA to employ a smaller staff of experienced attorneys and highly specialized support personnel while maintaining the flexibility to meet the demands of periodic, short-term, highly intensive, complex litigation needs. In FY 1988, as ERA works to resolve much of its remaining caseload, it will be facing talented and skilled litigation opponents used by the petroleum firms in contesting the government's cases. The Compliance program must be funded to maintain a staff of highly competent and experienced professionals in order to to properly represent the interests of the Department on behalf of the public.

Fuels Conversion

The goals of the Fuels Conversion activities are to manage the regulatory review of the conversion of existing oil and gas-fired facilities and exemptions from statutory prohibitions of burning oil or gas in new facilities, consistent with the public interest.

The present fuels conversion activity is authorized and required by the Powerplant and Industrial Fuel Use Act of 1978, as amended. The activity consists of the issuance of Prohibition Orders requested by utilities that desire to convert existing oil or gas-fired facilities to coal burning and the evaluation and approval of petitions for exemptions from prohibitions of the Fuel Use Act for new oil or gas-fired facilities.

During FY 1986, the administration submitted to Congress a proposed bill that includes the elimination of provisions of the Fuel Use Act related to prohibitions of burning oil or gas in newly constructed facilities. The bill eliminates the need for exemptions now processed by the Fuels Conversion activity. Accordingly, the FY 1988 funding request provides for only that activity related to the maintenance of the Prohibition Order program and the issuance of new orders. The agency expects to process two new Prohibition Orders and modify five existing orders at the request of utilities. Five FTEs and $250,000 contract support for environmental impact studies will be required for the Fuels Conversion activity in FY 1988.

Natural Gas and Electricity Operations

The goals of the Natural Gas and Electricity Operations activities are to manage the regulatory review of natural gas imports and exports, and to authorize exports of electricity and construction and operation of electric power transmission facilities at international borders, consistent with the public interest.

The natural gas activity is authorized and required by Section 3 of the Natural Gas Act, Titles III and IV of the Natural Gas Policy Act, and Sections 402, 403 and 405 of the DOE Organization Act. Applications to import and export natural gas are evaluated and approved unless determined not to be in the public interest. The Department of Energy's policy is to approve import/export arrangements that are buyer-seller negotiated and that provide supplemental supplies of gas at market-competitive prices. In FY 1986, due to increased competition in the marketplace, the agency issued orders on 57 import and export applications compared with the budgeted level of 27 import authorizations and no export authorizations. The number of cases processed is expected to stabilize at these increased levels in FY 1987 and FY 1988 because of increased import and export applications for spot market and short-term sales as market competition continues to increase. Long-term contracts are also being renegotiated to reflect more competitive market conditions and several new applications for long-term aggrangements are now under review. Since at least two long-term import applications and one long-term export application involve the construction of new pipeline facilities environmental impact studies will have to be made in order to comply with the National Environmental Policy Act. The agency will also continue to provide technical support for international consultations on natural gas trade. The natural gas activity will require 21 FTES for FY 1988.

The electricity import/export activity is authorized and required by Section 202(e) and (f) of the Federal Power Act and Executive Order 10485. Applications to export electricity are assessed for impact on sufficiency of the U.S. electric power supply, and facility permit applications are reviewed for environmental and system reliability consequences. During FY 1987, three electricity exports are expected to be authorized and three permits for facility construction processed one of which will be fully completed. During FY 1988, four permits for facility construction are expected to be processed with two completed, and two electricity export authorizations completed. However, it is anticipated that they will be more complex with larger volumes and physical structures involved. Furthermore, as the quantities of electricity imports have increased, there have been increases in the number of intervening parties in each proceeding. Some increase in generic analytical activity is also anticipated as import volumes increase. The agency will continue to monitor and analyze electricity import/export activity and publish an annual report on the exchanges that take place. Technical and analytical support will also be provided for bilateral discussions on electricity trade. The electricity activity will require 5 FTEs as well as $250,000 in contract support for FY 1988. Contract funds will be used primarily for environmental impact studies to comply with the National Environmental Policy Act; some contract funds may be used for reliability and other studies, mostly in support of the licensing activity.

Program Administration

The goal of this activity is to provide management and administrative support for ERA programs. The major objectives are to assure proper administration and management of the Compliance, Fuels Conversion, and Natural Gas and Electricity programs and to provide personnel, travel, budget, and other administrative support. This activity currently includes the Office of the Administrator and the Office of Management and Information Systems.

In FY 1988, the Program Administration staff will process and maintain personnel and organizational documents; prepare budget submissions and expenditure reports; allocate and monitor all aspects of budget execution; coordinate regional personnel and funding actions; control and respond to Congressional and public correspondence; and act as liaison with various administrative and financial offices within the Department. The funding request for Program Administration will support 10 FTEs.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

LEAD TABLE

Economic Regulatory Administration

Program	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs Base
Compliance	$14,281	$13,685	$13,685	$13,105	- 580
Fuels Conversion	1,142	2,000	2,000	587	-1,413
Natural Gas & Electricity Operations	2,079	2,060	2,060	2,092	+ 32
Program Administration	646	655	655	701	+ 46
Total Operating Expenses	$18,148	$18,400	$18,400	$16,485	-1,915
Staffing Total FTEs	250	211	211	191	- 20

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

SUMMARY OF CHANGES

Economic Regulatory Administration

FY 1987 Appropriation/FY 1988 Base	$18,400
Program Increases and Decreases:	
0 Decrease due to reduction in Compliance program caseload in FY 1988	(630)
0 Increase in severance cost for Compliance personnel	50
0 Reduction of Fuels conversion program	(1,413)
0 Net increase in other program costs	78

FY 1988 Congressional Budget Request	$16,485
	======

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

Economic Regulatory Administration

I. Preface: Compliance

The Compliance program administers the resolution of the enforcement activities that are the result of a wide spectrum of oil pricing and allocation regulations that governed the petroleum industry through most of the 1970's. Foremost among these was the Emergency Petroleum Allocation Act of 1973 (EPAA) which was in effect from October 1973 until January 1981. ERA, together with its predecessor organization has audited approximately 20,000 petroleum firms, identifying approximately $8.2 billion in alleged oil overcharges, and has only about 350 cases remaining unresolved representing approximately $3 billion of alleged oil overcharge moneys remaining uncollected. At the end of 1986 the case development work was completed and the program now consists primarily of litigating and the negotiated settlement of enforcement cases previously developed.

II. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	Change
Litigation	$ 9,040	$ 9,320	$ 9,005	- 315
Litigation Support	3,918	3,020	2,725	- 295
Post-Litigation	758	790	750	- 40
Management	506	555	625	+ 70
Total	$14,222	$13,685	$13,105	- 580

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Litigation	Conducted judicial and administrative litigation in 337 cases. Negotiated settlements with 73 firms to resolve outstanding cases. ($9,040; 155 FTEs)	Conduct judicial and administrative litigation in approximately 300 cases. Negotiate settlements with as many firms as possible, targeted at 50-60 firms. ($9,320; 130 FTEs)	Conduct judicial and administrative litigation in approximately 200 cases. Negotiate settlements with as many firms as possible; targeted at 35-55 firms. ($9,005; 120 FTEs)

III. Compliance (con't)

Program Activity	FY 1986	FY 1987	FY 1988
Litigation Support	Issued Proposed Remedial Orders (PROs) to 19 firms As requested by Department of Justice (DOJ), provided support for prosecution of willful violation cases. Supported litigation and settlement efforts in above activity. ($3,918, including $1,586 for contracted litigation support services; 40 FTEs)	Complete audits of all remaining firms and issue PROs as appropriate. As requested by DOJ, provide support for prosecutions of willful violation cases. Support litigation and settlement efforts in above activity. ($3,020, including $1,300 for contracted litigation support services; 24 FTEs)	Support litigation and settlement efforts in above activity. As requested by DOJ, provide support for prosecutions of willful violation cases. ($2,725, including $1,600 for contracted litigation support services; 15 FTEs)
Post-Litigation	Monitored compliance with approximately 500 final remedial and consent orders and institute enforcement action in federal district court where non-compliance has occurred. Collected on approximately 150 deliquent escrow accounts. ($758; 13 FTEs)	Monitor compliance with approximately 400 final orders and take enforcement action, as appropriate. Collect on approximately 125 deliquent escrow accounts. ($790; 11 FTEs)	Monitor compliance with approximately 300 final orders and take enforcement action, as appropriate. Collect on approximately 100 deliquent escrow accounts. ($750; 10 FTEs)
Management	Provide overall program and policy direction to enforcement activities. ($506, including $156 for personnel severance cost; 6 FTEs)	Provide overall program and policy direction to enforcement activities. ($555, including $200 for personnel severance cost; 5 FTEs)	Provide overall program and policy direction to enforcement activities. ($625, including $250 for personnel severance cost; 5 FTEs)

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

Economic Regulatory Administration

I. Preface: Fuels Conversion

The Fuels Conversion program manages the regulatory review of the conversion of existing oil and gas-fired facilities and exemptions from statutory prohibitions of burning oil or gas in new facilities, consistent with the public interest.

II. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	Change
Fuels Conversion Program	$ 1,095	$ 2,000	$ 587	-1,413

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
Fuels Conversion Program	Issued 3 final conversion orders; modify or rescind 2 conversion orders; processed 107 exemption requests; monitor achievement of natural gas conservation programs; 2 annual reports to Congress. ($1,095; 14 FTEs)	Issue 2 final conversion orders; modify or rescind 2 conversion orders; process 140 exemption requests; monitor achievement of natural gas conservation programs; 2 annual reports to Congress. ($2,000; 5 FTEs)	Assumes enactment of partial repeal of Fuel Use Act. Issue 2 final conversion orders; modify or rescind 5 conversion orders; monitor achievement of natural gas conservation programs; 2 annual reports to Congress. ($587; 5 FTEs)

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

Economic Regulatory Administration

I. Preface: Natural Gas & Electricity Operations

The Natural Gas and Electricity Operations activities manage the regulatory review of natural gas imports and exports, and authorize exports of electricity and construction and operation of electric power transmission facilities at international borders, consistent with the public interest.

II. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	Change
Natural Gas Program	$ 1,633	$ 1,460	$ 1,485	+ 25
Electricity Program	375	600	607	+ 7
Total	$ 2,008	$ 2,060	$ 2,092	+ 32

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Natural Gas Program	Processed 57 import/export applications; provide technical support for consultations with U.S. trading partners; participate in FERC proceedings. ($1,633; 21 FTEs)	Process 72 import/export applications; provide technical support for consultations with U.S. trading partners; participate in FERC proceedings. ($1,460; 21 FTEs)	Process 66 import/export applications; provide technical support for consultations with U.S. trading partners; participate in FERC proceedings. ($1,485; 21 FTEs)
Electricity Program	Processed 1 electricity export authorization and 1 facility construction permit. ($375, including $64 for contract support for environmental impact statements and reliability assessments; 4 FTEs)	Process 3 electricity export applications and 3 facility construction permits. ($600, including $250 for contract support for environmental impact statements and reliability assessments; 5 FTEs)	Process 2 electricity export applications and 3 facility construction permits. ($607, including $250 for contract support for environmental impact statements and reliability assessments; 5 FTEs)

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

Economic Regulatory Administration

I. Preface: Program Administration

This activity assures proper administration and management of ERA's Compliance, Fuels Conversion, and Natural Gas and Electricity Operations programs and provides personnel, travel, budget, and other administrative support.

II. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	Change
Administration	$621	$655	$701	+ 46

III. Activity Description

Program Activity	FY 1986	FY 1987	FY 1988
Administration	Provided management and administrative support for remaining ERA programs. ($621; 11 FTEs)	Provides management and administrative support for remaining ERA programs. ($655; 10 FTEs)	Provides management and administrative support for remaining ERA programs. ($701; 10 FTEs)

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

OBJECT CLASS

Economic Regulatory Administration

		FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Direct Funding: Compliance				
11.1	Full-time permanent	$9,145	$7,470	$6,720
11.5	Other personnel compensation	160	130	125
		------	------	------
11.9	Total personnel compensation	9,305	7,600	6,845
12.1	Personnel benefits	982	835	755
13.0	Benefits for former employees	156	200	250
21.1	Travel & transportation of persons	216	250	250
22.0	Transportation of things	40	60	60
23.0	Communications, utilities, & rent	1,354	2,280	2,620
24.0	Printing & reproduction	116	180	190
25.0	Other services	1,902	2,145	2,000
26.0	Supplies & materials	151	135	135
		------	------	------
99.0	Total direct funding	$14,222	$13,685	$13,105
		======	======	======

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

OBJECT CLASS

Economic Regulatory Administration

		FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Direct Funding: Fuels Conversion				
11.1	Full-time permanent	$559	$1,175	$220
11.5	Other personnel compensation	6	15	5
		-----	-----	-----
11.9	Total personnel compensation	565	1,190	225
12.1	Personnel benefits	60	130	25
21.1	Travel & transportation of persons	1	10	5
23.0	Communications, utilities & rent	395	288	67
24.0	Printing & reproduction	9	37	6
25.0	Other services	54	320	254
26.0	Supplies & materials	11	25	5
		-----	-----	-----
99.0	Total direct funding......................	$1,095	$2,000	$587
		=====	=====	===

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

OBJECT CLASS

Economic Regulatory Administration

		FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Direct Funding: Natural Gas & Electricity Operations				
11.1	Full-time permanent	$1,089	$1,185	$1,200
11.5	Other personnel compensation	10	15	15
11.9	Total personnel compensation	1,099	1,200	1,215
12.1	Personnel benefits	112	135	135
13.0	Benefits for former empoyees	34	0	0
21.1	Travel & transportation of persons	7	15	15
23.0	Communications, utilities & rent	443	300	360
24.0	Printing & reproduction	23	40	40
25.0	Other services	261	340	302
26.0	Supplies & materials	29	30	25
99.0	Total direct funding	$2,008	$2,060	$2,092

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

OBJECT CLASS

Economic Regulatory Administration

		FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Direct Funding: Program Administration				
11.1	Full-time permanent	$431	$431	$440
11.5	Other personnel compensation	8	8	9
11.9	Total personnel compensation	439	439	449
12.1	Personnel benefits	48	48	50
21.1	Travel & transportation of persons	7	15	15
23.0	Communications, utilities & rent	83	103	134
24.0	Printing & reproduction	8	13	15
25.0	Other services	26	28	29
26.0	Supplies & materials	10	9	9
99.0	Total direct funding	$621	$655	$701

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

APPROPRIATIONS/FTEs/ACCOMPLISHMENTS

Economic Regulatory Administration

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Compliance			
o Appropriation	$14,222	$13,685	$13,105
o Full-time Equivalents	214	170	150
o Major Refiner PROs Issued	2	10-15	0
o Non-Major Refiner PROs Issued	17	25-35	0
o Negotiated Settlements (Firms)	73	50-60	35-55
o Administrative Litigation (Cases)	187	150	125
o Judicial Litigation (Cases)	150	150	75
o Monitor Remedial and Consent Orders	500	400	300
Fuels Conversion			
o Appropriation	$ 1,095	$ 2,000	$ 587*
o Full-time Equivalents	14	5	5*
o Prohibition Orders Processed	5	4	7*
o Exemptions Requests Processed	107	140	0*

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* Assumes partial repeal of the Fuel Use Act which will not rescind provisions of FUA relating to Prohibition Orders.

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Natural Gas and Electricity Operations			
o Appropriation.........................	$ 2,008	$ 2,060	$ 2,092
o Full-time Equivalents..................	25	26	26
o Gas Import/Export Applications.........	57	72	66
o Electricity Export Applications........	1	3	2
o Facility Construction Permits..........	1	3	3
Program Administration			
o Appropriation.........................	$ 621	$ 655	$ 701
o Full-time Equivalents..................	11	10	10
Total Appropriation...............	$17,946	$18,400	$16,485
Total Full-time Equivalents.......	264	211	191

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION

OVERVIEW

Office of Hearings and Appeals

The goal of the Office is to expeditiously process and fairly resolve the adjudicatory matters which, either by statute, regulation, or DOE order, are within its jurisdiction. The Office is responsible for:

- Adjudicating pending compliance cases and all remaining enforcement matters brought by the Economic Regulatory Administration. These cases currently involve alleged violations of the Federal petroleum price and allocation regulations which, exclusive of interest, exceed $2.6 billion.

- Administering refund proceedings and distributing to injured parties between $1.5 and $3.0 billion obtained as a result of petroleum enforcement and settlement actions. The Office must also make, pursuant to the Petroleum Overcharge Distribution and Restitution Act of 1986, annual estimates, determinations, and disbursements of the amount of oil overcharge funds in excess of that needed to make restitution to injured parties.

- Reviewing exception applications from individual firms or persons who believe that a DOE-issued rule, regulation, or order causes a serious hardship, gross inequity, or an unfair distribution or burdens.

- Hearing appeals from adverse determinations regarding Freedom of Information Act requests submitted to all elements of the Department.

- Deciding all of the Department's remaining adjudicatory matters except for those administered by the Federal Energy Regulatory Commission or the Board of Contract Appeals.

The two major priorities of the Office are to complete and close remaining compliance matters, and to administer and process -- as expeditiously as possible -- the increasing number of refund proceedings and applications that will be filed during FY 1987 and FY 1988. Meeting these goals will terminate matters pertaining to the prior DOE regulatory programs and resolve all of the complex issues involving the distribution of large sums of money and the diverse interests of energy producers, industry claimants, consumers, the United States government and other governmental entities.

Prompt attainment of these goals will, however, be impossible unless sufficient funding is provided to allow the Office to continue its present staffing level of 84 FTE's at least through FY 1988. We anticipate that a massive number of refund requests will be filed during FY 1987 and FY 1988 -- perhaps as many as 100,000. These applications, which are filed by claimants from virtually every state, require professional, detailed and timely analysis. In addition, during each year beginning with FY 1988, OHA expects to continue to process a relatively constant flow of regular adjudications. These include receipts of 200 to 500 petitions related to the Freedom of Information Act, the Privacy Act, information requirements of the Energy Information Administration, and petitions for private grievance or redress.

The FY 1988 budget request is for $5,195,000. This represents a nominal 3.9 percent increase over the funding level requested for FY 1987, and will provide for salaries and support for 84 FTE's -- a continuation of the staffing projected for FY 1987.

The Departmental Budget Request represents a measured and moderate responses to OHA's known casework, as well as the additional workload which will result from the administering of refund applications. Specifically, OHA projects receiving 120 new compliance-related petitions in FY 1987, and approximately 20 new compliance-related petitions in FY 1988. These enforcement and compliance-related cases raise many novel legal issues and represent the most complex, time-consuming and highly contested cases ever filed with OHA. Despite this level of difficulty, the average OHA productivity rate has risen to .7 decision per analyst/ attorney per month, or approximately 423 case resolutions per year. On this basis, OHA estimates that its beginning compliance-related inventory in FY 1988 will be 148 cases and, with a staffing level of 84 full-time staff year equivalents, that the inventory of unresolved compliance cases at the end of FY 1988 will total 33. In addition, OHA anticipates receiving approximately 200 non-compliance related cases in FY 1987 and 200 cases in FY 1988. Based on an estimated FY 1988 beginning inventory of 120 non-compliance cases, OHA estimates that its inventory of unresolved non-compliance related cases at fiscal year end will total 32. This reflects a total case inventory decrease of approximately 28 percent. Funding at the Departmental Request level for FY 1988, therefore, will enable OHA to maintain its present level of staffing, meet acceptable processing times for petitions and applications in inventory, and begin preparation for an increased workload resulting from the distribution of refund monies pursuant to the DOE regulations at 10 C.F.R. Part 205, Subpart V.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

LEAD TABLE

Office of Hearings and Appeals

	FY 1986 ACTUAL	FY 1987 APPROPRIATION	FY 1988 BASE	FY 1988 REQUEST	REQUEST vs BASE
TOTAL:					
Operating Expenses:	$5,275	$5,000	$5,000	$5,195	+ $195
Staffing Total FTE's:	84	84	84	84	+ 0

Authorizations: Sections 503, 504(a), P.L. 95-91; Section 21, P.L. 93-275; Section 104, P.L. 94-385; Section 5, P.L. 93-159; Section 207, P.L. 92-210; P.L. 89-554; P.L. 93-579.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

SUMMARY OF CHANGES

Office of Hearings and Appeals

FY 1987 Appropriation Enacted/FY 1988 Base	$5,000
Adjustment for Program Direction and Administrative Support Costs	+ 195
FY 1988 Congressional Budget Request	$5,195

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

Office of Hearings and Appeals

Program Activity	FY 1986	FY 1987	FY 1988
CASE RESOLUTION:			
Compliance and Related Filings	During FY 1986 OHA received 133 new compliance and related cases, and resolved 252 cases. Inventory of unresolved compliance cases was reduced by 41 percent.	As of October 1, 1986, OHA had 171 compliance and related cases in inventory. Using ERA projections, OHA expects to receive approximately 120 new filings in FY 1987. On the basis of regulatory processing requirements and average actual productivity rates, OHA expects to resolve 143 compliance and related cases during FY 1987 and have an inventory of 148 pending compliance cases on hand at fiscal year end.	OHA expects to receive 20 cases related to compliance actions during FY 1988, mostly generated from existing proceedings. With the requested funding and staffing, 135 petitions should be resolved leaving 33 open compliance and related cases at the end of FY 1988.
Non-compliance Filings	During FY 1986 OHA resolved 257 non-compliance cases. This includes the issuance of 82 final decisions implementing Subpart V procedures to distribute refund monies within OHA's jurisdiction. Inventory of unresolved non-compliance cases was reduced by 12 percent.	As of October 1, 1986, approximately 200 non-compliance cases were on hand and new receipts are projected to be approximately 200. Of these 400 cases, 280 are projected to be resolved during FY 1987. Thus approximately 120 of these cases would remain in inventory at the end of FY 1987.	An estimated 200 non-compliance cases are projected to be received for FY 1988, in addition to the open inventory of 120 cases remaining from FY 1987. It is expected that all except 32 of the cases would be resolved during the fiscal year.

Program Acitivity	FY 1986	FY 1987	FY 1988
Refund Applications	During FY 1986 OHA processed over 9,200 oil overcharge applications, resulting in refunds of more than $139,400,000 to injured parties.	As of October 1, 1986, OHA had 8,346 refund applications pending. The number of refund applications to be received during FY 1987, however, cannot be accurately estimated, since it is directly related to the level of ERA settlement activity, the number of Subpart V petitions filed with OHA, and the crude oil refund proceedings now being instituted pursuant to the DOE Policy Statement regarding crude oil overcharges and the Stripper Well Settlement Agreement.	OHA will continue processing refund applications received as a result of Subpart V proceedings which it administers.
TOTAL	$5,275	$5,000	$5,195
Staffing FTE's	84	84	84

NOTE: Each OHA staff member works on matters relating to more than one of the above key subactivities. There is no way to estimate accurately, therefore, the amount of staff hours (and corresponding portions of OHA's budget) actually spent on each of OHA's various functions. Accordingly, it is not possible to calculate the estimated costs for each of the above key subactivities.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ECONOMIC REGULATION
(dollars in thousands)

OBJECT CLASS

Office of Hearings and Appeals

		FY 1986 ACTUAL	FY 1987 ESTIMATE	FY 1988 ESTIMATE
	Direct Funding:			
	Personnel compensation:			
11.1	Full-time permanent	$2,672	$2,785	$2,894
11.3	Other than full time	238	248	258
11.5	Other personnel compensation	34	35	36
11.9	Total personnel compensation	$2,944	$3,068	$3,188
12.1	Personnel benefits: Civilian	332	349	362
21.0	Travel and transportation of persons	20	20	21
22.0	Transportation of things	30	30	31
23.2	Communications, utilities, and other rent	898	898	933
24.0	Printing and reproduction	262	262	272
25.0	Other services	281	281	292
26.0	Supplies and materials	126	92	96
	Total, direct obligations	$4,893	$5,000	$5,195

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

ENERGY INFORMATION ACTIVITIES

VOLUME 4

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ENERGY INFORMATION ADMINISTRATION

For necessary expenses in carrying out the activities of the Energy Information Administration, [$60,301,000,] $61,599,000, of which $2,000,000 shall remain available until expended. (Department of the Interior and Related Agencies Appropriations Act, 1987, 1987, as included in Public Laws 99-500 and 99-591, section 101(h).)

Explanation of Change

The proposed language will allow $2 million to remain available until expended to cover computer software leases, many of which are covered by fixed GSA schedules, and ongoing computer maintenance costs to ensure smooth and efficient operation of the EIA computer center which supports the energy information needs of the Department of Energy and other Federal agencies. These funds will also be available for Energy Consumption Surveys that span three fiscal years through the planning, design, implementation, analysis, and publication phases. The current one year appropriation has impeded the effective utilization of resources by restricting the use of available funds to a twelve month period.

DEPARTMENT OF ENERGY

FISCAL YEAR 1988 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

ENERGY INFORMATION ACTIVITIES

BUDGET AUTHORITY IN THOUSANDS OF DOLLARS

	FY 1986 Actual	FY 1987 Estimate	FY 1988 Request
National Energy Information:			
Oil and Gas	$ 12,267	$ 12,569	$ 12,625
Coal, Nuclear, Electric and Alternate Fuels	3,912	3,989	4,809
Energy Markets and End Use	4,362	4,130	4,032
Automated Data Processing Services Staff	9,586	8,727	7,413
Energy Information Center	733	604	628
Statistical Standards	879	855	1,090
Program Directions/FERS	18,512	19,104	20,777
Subtotal, National Energy Information System	50,251	49,978	51,374
Policy and Management	7,473	10,323	10,225
Total, Energy Information Activities	$ 57,724	$ 60,301	$ 61,599

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY INFORMATION ADMINISTRATION
(dollars in thousands)

AMOUNTS AVAILABLE FOR OBLIGATION

	FY 1987	FY 1988
Appropriation	$60,301	$61,599
Balance transferred in (FY 1987 pay raise)	469	0
Subtotal	$60,770	$61,599
RECEIPTS AND REIMBURSEMENTS		
Federal Energy Regulatory Commission	$ 4,200	$ 4,579
Strategic Petroleum Reserve	1,000	900
Policy, Planning and Analysis	150	150
Fossil Energy	120	120
Conservation and Renewable Energy	24	25
Hearings and Appeals	73	75
Nuclear Energy	1	1
Management and Administration	120	135
Environment, Safety and Health	150	152
Office of Civilian Radioactive Waste Management	1,130	1,067
Environmental Protection Agency	2	2
Department of Navy	50	50
Office of Surface Management (Interior)	8	10
Congressional Budget Office	6	6
Bureau of Economic Analysis (Commerce)	2	2
Bureau of Land Management (Interior)	4	4
Social Security Administration	250	250
Bureau of the Census (Commerce)	75	42
Naval Petroleum Reserve	10	0
U. S. Geological Survey	30	0
Total obligations [1]	$68,175	$69,169

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[1] Excludes $120 in FY 1988 reimbursements from the Interagency Data Base and Projections Group.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY INFORMATION ADMINISTRATION

OVERVIEW

Energy Information

The Energy Information Administration (EIA) is the Nation's primary source of comprehensive energy information. EIA provides relevant and timely energy data and analysis reports to the Executive Branch, Congress, State governments, industry and the public, so that those who make decisions about energy do so with adequate information at their disposal. EIA also provides energy data, analysis, and data processing support to the Federal Energy Regulatory Commission and to other Department of Energy (DOE) offices.

In accordance with its legislative mandate, the EIA collects, evaluates, assembles, analyzes, and disseminates energy data and information. Focal points for data collection and analysis are energy reserves, production, consumption, distribution, technology, related economic information, and resource adequacy to meet the Nation's demands in the near and longer term future.

The EIA budget is divided into two decision units. The National Energy Information System decision unit contains the operational elements of EIA. The Policy and Management decision unit provides for the central management, guidance, and coordination of all EIA activities.

In FY 1988 EIA will place primary emphasis on the maintenance of the national energy information program. EIA products are a recognized and integral component of the Federal statistics program. For example, EIA data are used by the Bureau of Economic Analysis for the Gross National Product accounts, by the Bureau of Labor Statistics for both the Producer Price Index and the Consumer Price Index, and by the Environmental Protection Agency for air quality standards development and motor gasoline lead phasedown analysis. EIA is recognized as the sole source of comprehensive data on U.S. coal production, distribution, and consumption. The International Energy Agency relies on EIA information and analyses as the official statistics to describe the U.S. energy situation in international forums and publications. EIA data and analysis also provide the foundation for DOE emergency preparedness activities.

The FY 1988 budget request is $61.6 million, an increase, without accounting for inflation, of $1.3 million over FY 1987. After inflation, the EIA program reflects a decrease of about $1.9 million. In the FY 1986 and 1987 budgets a large portion of EIA resources was devoted to the purchase of a new mainframe computer. In FY 1988 these resources will begin to be returned to ongoing data and analysis programs, so several projects which have been deferred in FY 1986 and 1987 will be restored in FY 1988. These projects generally involve maintaining overall data quality, integrating data systems, and improving data collection techniques. A few examples include coal and electric power data requirements reviews, petroleum marketing data consolidation, and systems integration studies to ensure maximum efficiency across all EIA information systems. The FY 1988 request also provides for continuing the implementation of OMB Circular A-130, Management of Federal Information Resources, in the ADP Services area and replacement of older, inefficient telecommunications equipment, including terminals, printers and modems.

The FY 1988 request, in recognition of the need to rescope lower priority programs to support deficit reduction, assumes a modified and streamlined Residential Transportation Energy Consumption Survey (RTECS). The proposed RTECS reduction is designed to limit the survey to the minimum requirements expressed by the users of those data while maintaining the quality of the information that is collected. The request also contains decreased funding for natural gas data and contingency analysis and increased funding for electric power information. This realignment of resources reflects a planned change in the EIA program in anticipation of changing requirements of decisionmakers. Natural gas information requirements are expected to decrease as deregulation proceeds. Expansion of electric generating capacity and related cost issues are expected to become an area of increased interest. Electric power data program improvements contained in the FY 1988 request are both remedial and geared toward providing a better and more timely data base for electric power analyses. The reduction in contingency analysis funding reflects a planned shift to external funding for this interagency effort and will not affect EIA's analysis capability.

EIA has included within the FY 1988 budget request two programs which have historically been of particular interest to the Congress and which were restored by Congress in EIA's FY 1987 budget. These are the Financial Reporting System (FRS) and the State Energy Data System (SEDS). EIA is exploring alternatives to the existing FRS data collection, consistent with the statement of the managers in the conference report accompanying the FY 1987 Continuing Resolution. Over the past few years EIA has streamlined SEDS and improved the timeliness of the information published from the system. SEDS publications are a useful source of State-level information and EIA will continue to publish these data in FY 1988.

The FY 1988 request does not fund the State oil price and inventory agreements which comprise the State Heating Oil Grants program. Much of the information produced from this program is available through other EIA surveys. This program was started in FY 1979 as a result of apprehensions of fuel oil price escalations and shortages. As of November 1986, the real price of distillate fuel oil had declined to pre-embargo levels; less than half of the 1981 peak. In addition, there has not been a shortage since before the decontrol of petroleum prices. Thus, within the context of available resources, this program is a lower priority than other EIA programs.

The total FY 1988 FTE request of 470 for EIA is unchanged from the FY 1987 level; however, one realignment is proposed. Two FTE's will be shifted from the Office of Oil and Gas to the Office of ADP Services for planning and management of EIA computer and telecommunications services, including software analysis, computer performance analysis, and personal computer and telecommunications support. As in FY 1987, the FY 1988 request provides for 448 FTE's directly funded by EIA, 18 FTE's reimbursed by the Federal Energy Regulatory Commission, and 4 FTE's funded by the DOE Office of Civilian Radioactive Waste Management.

The long-range plan for EIA over the FY 1989 through FY 1992 period, as reflected in the FY 1988 request, will be to maintain the National Energy Information System to ensure continued availability of relevant data and analysis capability in compliance with sound statistical practices. Cognizant of the current emphasis on deficit reduction, quality maintenance investments designed to achieve improvements will be of lower priority compared with continuing basic data series and forecasts. Routine quality maintenance to prevent any product deterioration will, of course, be continued and will be included in ongoing program operating costs. The plan calls for EIA's end use consumption surveys to continue on a triennial cycle which basically provides for level funding from year to year. The FY 1988 request includes the Manufacturing Energy Consumption Survey and the Residential Transportation Energy Consumption Survey. The Nonresidential Buildings Energy Consumption Survey is scheduled to be funded in the FY 1989 request and the next Residential Energy Consumption Survey in the FY 1990 request.

No significant program enhancements are currently planned over the next four years. However, resources will be realigned to meet changing requirements. For example, by 1990, natural gas decontrol could be a closed issue whereas electrical generating capacity and the status of coal-fired and nuclear plants may come to the forefront of the energy debate. Thus the mix of resources devoted to the various fuel source components of the National Energy Information System will vary from year to year to meet the needs of energy policy formulators and decisionmakers within and outside government as well as to keep the general public informed.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY INFORMATION ADMINISTRATION
(dollars in thousands)

LEAD TABLE
NATIONAL ENERGY INFORMATION SYSTEM

Activity	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Oil and Gas	$12,267	$12,569	$13,074	$12,625	-$ 449
Coal, Nuclear, Electric, Alternate Fuels	3,912	3,989	4,149	4,809	+ 660
Energy Markets and End Use	4,362	4,130	4,296	4,032	- 264
ADP Services [1]	9,586	8,727	9,068	7,413	- 1,655
National Energy Information Center	733	604	628	628	0
Statistical Standards	879	855	890	1,090	+ 200
Program Direction	18,512	19,104	20,777	20,777	0
Total, Operating Expenses, NEIS	$50,251	$49,978	$52,882	$51,374	-$1,508
Staffing, Total FTE's [2]					
Direct	397	417	417	417	
Reimbursable	18	18	18	18	

Authorization: P.L.'s 75-688, 93-319, 94-963, 94-385, 95-619, 95-620, 95-621, 96-102, 96-294, 97-415, 97-257, 16, U.S.C. 791a et. seq., and P.L. 95-91

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[1] Includes functional transfer from Policy and Management for ADP supplies--$250 in FY 1986, $200 in FY 1987, and $200 in FY 1988.

[2] Excludes 4 FTE's funded by the Nuclear Waste Fund. FY 1987 FTE's are 7 lower than in last year's request. The FY 1987 funding associated with these 7 FTE's will be used for the increased agency contributions to the new retirement system.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY INFORMATION ADMINISTRATION
(dollars in thousands)

SUMMARY OF CHANGES

National Energy Information System

FY 1987 Appropriation Enacted [1]	$49,978
Inflation on Contractual Activities and Travel	+1,238
Salary and Benefits Pricing Adjustments (impact of 1987 pay raise, increased contributions to retirement, promotions, within grade increases)	+1,666
FY 1988 Base	$52,882
Program Increases:	
Petroleum Marketing Data Consolidation	+ 127
Coal and Electricity Data Requirements Reviews	+ 125
Electric Power Data and Modeling Evaluations and Modifications	+ 430
Nuclear Data and Forecasting Evaluations and Modifications	+ 105
Energy Markets and End Use Model Maintenance and Integration	+ 227
Increased Statistical Oversight and Systems Integration Activities	+ 200
Program Decreases:	
State Heating Oil Grants Program Funding	- 200
Oil and Gas Supply and Reserves Data--Efficiencies and Decreased Activity	- 376
Difference between FY 87 (Residential) and FY 88 (Manufacturing, Res. Transportation) End Use Survey Activities	- 273
Financial Reporting System Efficiencies	- 38
International Model Development (Decreased Activity) and Contingency Analysis (Change to Reimbursable Funding)	- 180
Five-Year Computer Replacement Funding Requirements	-1,655
FY 1988 Congressional Budget Request	$51,374

[1] Includes functional transfer of $200 from Policy and Management for ADP supplies. Excludes $469 "balance transferred in" for FY 1987 pay raise.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY INFORMATION ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

NATIONAL ENERGY INFORMATION SYSTEM

I. Preface: National Energy Information System

The National Energy Information System (NEIS) decision unit contains the operational elements of the Energy Information Administration (EIA), providing a comprehensive treatment of energy information, including gathering, interpretation, analysis, processing, auditing, and dissemination services. NEIS is composed of six major elements. The Office of Oil and Gas conducts information and analysis programs concerning petroleum and natural gas supply, marketing, and reserves. The Office of Coal, Nuclear, Electric and Alternate Fuels develops, operates, and maintains the statistical and analytical information systems necessary to collect, process, and interpret data and conduct forecasting and analysis activities in the respective fuel areas. On a reimbursable basis, both of these Offices provide major contract and staff support to the Federal Energy Regulatory Commission (FERC) and the latter also supports the Office of Civilian Radioactive Waste Management. The Office of Energy Markets and End Use maintains statistical and analytical systems concerning energy consumption, and other subjects which cut across different energy sectors, including information on the international energy situation, economic and financial matters, and energy supply and demand balances. The Office of ADP Services provides computer processing support services for in-house and other DOE energy information programs and for FERC regulatory programs. The National Energy Information Center (NEIC) performs editorial and graphics preparation for EIA information products. NEIC also has primary responsibility for information dissemination. The Office of Statistical Standards provides coherent and credible strategies across EIA for information collection, analysis, and forecasting; develops processing, documentation, and archiving standards; provides data quality oversight; and manages the Department's energy information forms clearance process. Program direction provides funds for the salaries, benefits, and travel for NEIS staff.

II. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Oil and Gas:				
Petroleum Supply Information	$ 4,893	$ 5,040	$ 5,094	+ 1.1
Petroleum Marketing Information	3,827	3,775	3,855	+ 2.1
Reserves and Natural Gas Information	3,547	3,754	3,676	- 2.1
Subtotal, Oil and Gas	$12,267	$12,569	$12,625	+ 0.4
Coal, Nuclear, Electric and Alternate Fuels:				
Coal Information	$ 1,116	$ 923	$ 1,086	+17.7
Electric Power Information	1,946	1,786	2,287	+28.1
Nuclear Information	850	1,280	1,436	+12.2
Alternate Fuels Information	0	0	0	--
Subtotal, Coal, Nuclear, Electric and Alternate Fuels	$ 3,912	$ 3,989	$ 4,809	+20.6
Energy Marketing and End Use:				
Integrated and Economic Energy Information	$ 1,270	$ 1,322	$ 1,564	+18.3
Energy End Use Information	2,632	2,315	2,135	- 7.8
International and Contingency Information	460	493	333	-32.5
Subtotal, Energy Markets and End Use	$ 4,362	$ 4,130	$ 4,032	+ 2.4
ADP Services [1/]	$ 9,586	$ 8,727	$ 7,413	-15.1
National Energy Information Center	$ 733	$ 604	$ 628	+ 4.0
Statistical Standards	$ 879	$ 855	$ 1,090	+27.5
Program Direction	$18,512	$19,104	$20,777	+ 8.7
Total, National Energy Information System	$50,251	$49,978	$51,374	+ 2.8

[1/] Includes functional transfer from Policy and Management for ADP supplies--$250 in FY 1986, $200 in FY 1987, and $200 in FY 1988.

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Petroleum Supply Information	Produce weekly, monthly, and annual petroleum supply reports, including utilization of advanced statistical techniques and strengthening data protection techniques. ($4,893)	Continue to produce and publish basic weekly, monthly, and annual petroleum supply statistics. Complete three-year development of error detection/correction methodologies to increase operating efficiencies. ($5,040)	Continue FY 1987 program. Reduce funding for the Weekly Petroleum Status Report through institution of efficiencies in that program. Inflation: +$202 Prog. change: -$148 ($5,094)
Petroleum Marketing Information	Collect and publish monthly and annual data concerning petroleum product sales and prices. Conduct sample rotation and revise estimation procedures. Publish key marketing series data in an annual publication. Fund State heating oil grant program. ($3,827)	Continue to produce basic petroleum marketing data series. Eliminate efforts to improve frames coverage for diesel, kerosene, and propane supplies. Scale back petroleum marketing data consolidation effort. Fund State heating oil grant program. ($3,775)	Continue activities at the FY 1987 level of effort with the addition of restoring efforts to integrate all petroleum marketing data into a single unified data base. Eliminate State heating oil grant program. Inflation: +$153 Prog. change: -$73 ($3,855)

Program Activity	FY 1986	FY 1987	FY 1988
Reserves and Natural Gas Information	Produce annual data series on reserves and production of crude oil, natural gas, and natural gas liquids, and monthly reports on natural gas supplies, disposition, and prices. Conduct a series of studies on natural gas regulations. ($3,547)	Continue to produce basic energy data series and topical analyses. Complete the integrated natural gas data base. Update natural gas supply analysis to reflect changing regulatory environment. ($3,754)	Continue to produce basic energy data series. Reduce natural gas data program costs and reserves evaluation activities. Transfer 2 FTE's to the office of ADP Services. Inflation: +$150 Prog. change: -$228 ($3,676)
Coal Information	Collect and analyze coal information and produce weekly, monthly, quarterly and annual statistical reports. Maintain historical data bases. Conduct limited analysis of coal supply, transportation, and exports. Develop coal imports monitoring program in response to new legislative requirements. ($1,116)	Continue to maintain historical data bases and produce basic energy data series. Conduct limited coal analysis. Produce coal imports data. Reduce coal model maintenance and updates and defer quality maintenance, particularly requirements analysis, for existing data programs. ($923)	Continue activities at the FY 1987 level of effort and restore funding for data requirements reviews for coal surveys. Inflation: +$38 Prog. change: +$125 ($1,086)

Program Activity	FY 1986	FY 1987	FY 1988
Electric Power Information	Produce monthly, quarterly, and annual statistical reports on all aspects of electric power. Maintain historical data bases. Develop electric power projections. Conduct analysis of operational and financial aspects of electric power industry including cogeneration and imports. ($1,946)	Continue basic data and analysis program, and support to other agencies. Defer quality maintenance projects, particularly requirements analysis, and defer effort to develop an integrated financial analysis capability. ($1,786)	Continue basic program with funds restored for requirements reviews of electric power surveys and for modeling efforts. Implement a microcomputer-based data collection for the annual electric generator report. Increase funding to implement electric power data improvements. Inflation: +$71 Prog. change: +$430 ($2,287)
Nuclear Information	Produce data concerning nuclear fuels for statistical reports and analyses. Conduct uranium viability program using FY 1985 funds provided by DOE Office of Nuclear Energy. Support the Department's nuclear waste management activities. ($850)	Produce basic nuclear energy data and key analysis. First year of EIA funding ($500) of the uranium industry viability program. Continue to support the Department's nuclear waste management program. Decrease nuclear fuel cycle analysis. ($1,280)	Continue FY 1987 activities; implement a microcomputer-based data collection for the annual uranium industry survey; and perform evaluation of short term nuclear forecasting errors. Inflation: +$51 Prog. change: +$105 ($1,436)

Program Activity	FY 1986	FY 1987	FY 1988
Alternate Fuels Information	Conduct Solar Collector Manufacturing Survey and produce report with reimbursable funds provided by DOE Office of Conservation and Renewable Energy. Maintain minimal staffing to monitor activities in the alternate fuels area. ($0)	Maintain minimal awareness of activities in the alternate fuels area. ($0)	Maintain minimal awareness of activities in the alternate fuels area. ($0)
Integrated and Economic Energy Information	Produce EIA's baseline energy forecasts. Prepare monthly and annual integrated energy statistical publications. Develop automated linkages to energy source data bases. Continue Financial Reporting System (FRS), State Energy Data System (SEDS), and State Energy Price and Expenditures Data System (SEPEDS). ($1,270)	Continue to produce baseline energy forecasts. Defer model enhancements. Produce monthly and annual integrated historical data. Continue FRS, SEDS, and SEPEDS. Perform energy industry financial and tax analysis using publicly available data. ($1,322)	Continue energy forecasting and restore model maintenance to FY 1985 level. Integrate end use modeling efforts--residential, industrial, transportation. Continue FRS and SEDS/SEPEDS. Inflation: +$53 Prog. change: +$189 ($1,564)

Program Activity	FY 1986	FY 1987	FY 1988
Energy End Use Information	Fund the Non-Residential Buildings Energy Consumption Survey (NBECS). Conduct the 1985 Manufacturing Energy Consumption Survey (MECS). Perform needed quality maintenance activities. ($2,632)	Fund the Residential Energy Consumption Survey (RECS). Begin compiling results of the NBECS. Funding decrease due to the fact that RECS is a less complex and, therefore, less costly survey than NBECS to implement and analyze. ($2,315)	Fund the 1988 MECS. Update the survey frame for the NBECS. Conduct a modified and streamlined Residential Transportation Energy Consumption survey (RTECS) to meet the minimum requirements expressed by data users. Inflation: +$93 Prog. change: -$273 ($2,135)
International and Contingency Information	Collect and publish information concerning international energy activities and monitor the energy situation. Provide contingency analysis to DOE, interagency committees, and the International Energy Agency. ($460)	Continue the international energy data and contingency analysis programs. Maintain and document contingency planning models. ($493)	Continue basic program. Eliminate contract support for development of world energy demand and price model. Continue contingency analysis program. Any preparation of semi-annual classified report on hypothetical oil supply disruptions will be funded on a reimbursable basis by agencies involved (Interagency Data Base and Projections Group). Inflation: +$20 Prog. change: -$180 ($333)

Program Activity	FY 1986	FY 1987	FY 1988
ADP Services	Replace the IBM mainframe computer and associated peripheral equipment. Maintain publications automation. Operate ADP facility. Provide computer services to FERC and other DOE Offices on a reimbursable basis. ($9,586)	Continue FY 1986 activities. Funding requirements associated with the five-year mainframe replacement effort decline. ($8,727)	Continue operation and maintenance of ADP facility at FY 1987 level of effort. Funding requirements associated with the five-year mainframe replacement effort decline. Fund replacement of older, inefficient telecommunications equipment including terminals, printers, and modems. Inflation: +$341 Prog. change: -$1,655 ($7,413)
National Energy Information Center	Perform editorial and graphics preparation and dissemination activities for all EIA information products. Respond to public inquiries. Support microfilming and document indexing. ($733)	Continue FY 1986 activities with reduced levels for microfilming, publications support, and mail list maintenance. ($604)	Continue FY 1987 level of effort. Inflation: +$24 ($628)

Program Activity	FY 1986	FY 1987	FY 1988
Statistical Standards	Develop standards for statistical integrity and monitor conformance with standards. Maintain Data Resources Directory. Fund independent expert reviews of major studies. Perform systems integration studies. Operate forms clearance and burden control program. ($879)	Operate basic programs at FY 1986 level. Postpone publication of a handbook of methods. Reduce activity in model quality audits. Investigate systems integration requirements using limited amount of in-house personnel. ($855)	Continue FY 1987 program with funding restored for systems integration studies. Reduce backlog in statistical oversight activities (increase audits from 8 to 11 per year), consistent with Professional Audit Review Team recommendation. Inflation: +$35 Prog. change: +$200 ($1,090)
Program Direction	Provide funds for salaries, benefits, and travel for National Energy Information System staff. ($18,512)	Continue FY 1986 activities. Funds 417 FTE's and partially funds increased agency contributions to the new Federal Employees Retirement System (FERS) (beginning April 1987). Does not include funds for FY 1987 3% pay raise (effective January 1987). ($19,104)	Provide funds for salaries, benefits, and travel for 417 FTE's. Includes funding for full-year impact of FY 1987 pay raise and increased agency contributions to FERS. Shift 2 FTE's from Oil and Gas to ADP Services. ($20,777)
NATIONAL ENERGY INFORMATION SYSTEM TOTAL	$50,251	$49,978	$51,374

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY INFORMATION ADMINISTRATION
(dollars in thousands)

ANALYSIS OF BUDGET BY OBJECT CLASS

National Energy Information System

Direct Obligations	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Personnel Compensation:			
11.1 Full-time permanent.............	$ 15,963	$ 16,574	$ 17,097
11.3 Other than full-time permanent......................	353	362	318
11.5 Other personnel compensation.....	266	266	265
11.9 Total personnel compensation [1]..	16,582	17,202	17,680
12.1 Personnel benefits, civilian.....	1,743	2,266	2,884
21.0 Travel and transportation of persons.......................	158	205	213
23.2 Communications, utilities, and other rent.....................	253	232	241
25.0 Other services..................	30,499	30,024	29,825
26.0 Supplies and Materials	734	518	531
99.0 Subtotal, Direct Obligations [1]..	$ 49,969	$ 50,447	$ 51,374

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[1] FY 1987 Includes $469 "balance transferred in" for FY 1987 pay raise.

Department of Energy
FY 1988 CONGRESSIONAL BUDGET REQUEST
Energy Information Administration
(dollars in thousands)

ANALYSIS OF BUDGET BY OBJECT CLASS

National Energy Information System

Reimbursable Obligations	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
11.1 Full-time permanent.............	$ 967	$ 956	$ 933
12.1 Personnel benefits, civilian......................	107	130	152
21.0 Travel and transportation of persons......................	18	9	9
25.0 Other services..................	6,173	6,030	6,152
99.0 Subtotal Reimbursable Obligations....................	7,265	7,125	7,246
99.9 Total Obligations...............	$ 57,234	$ 57,572	$ 58,620

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY INFORMATION ADMINISTRATION
(dollars in thousands)

LEAD TABLE

POLICY AND MANAGEMENT

Activity	FY 1986 Actual	FY 1987 Appropriation	FY 1988 Base	FY 1988 Request	Request vs. Base
Program Support	$ 441	$ 322	$ 173	$ 173	-0-
Program Direction [1]	7,032	10,001	10,415	10,052	-363
Total, Operating Expenses, Policy and Management	$ 7,473	$10,323	10,588	$10,225	-363
Staffing, Total FTE's [2]	31	31	31	31	

Authorization: P.L.'s 75-688, 93-319, 94-963, 94-385, 95-619, 95-620, 95-621, 96-102, 96-294, 97-415, 97-257, 16, U.S.C. 791a et. seq., and P.L. 95-91

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[1] Includes functional transfer to National Energy Information System for ADP supplies--$250 in FY 1986, $200 in FY 1987, and $200 in FY 1988.

[2] FTE's are 2 lower than in the FY 1987 Congressional budget request. The FY 1987 funding associated with these 2 FTE's will be used for the increased agency contributions to the new retirement system and the FY 1987 pay raise for Policy and Management FTE's.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
Energy Information Administration
(dollars in thousands)

SUMMARY OF CHANGES

Policy and Management

FY 1987 Appropriation Enacted [1/]	$ 10,323
Inflation on Contractual Activities, Travel, and Training	+ 344
Salary and Benefits Pricing Adjustments (promotions, within grade increases, increased agency contributions to retirement)	+ 67
Contract Administration (Elimination of Contract Award Fees)	- 146
FY 1988 Base	$10,588
Program Decreases:	
Reduction in Administrative Overhead Costs	- 363
FY 1988 Congressional Budget Request	$10,225

[1/] Includes functional transfer of $200 to National Energy Information System for ADP supplies.

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY INFORMATION ADMINISTRATION
(dollars in thousands)

KEY ACTIVITY SUMMARY

POLICY AND MANAGEMENT

I. Preface: Policy and Management

Policy and Management provides resources for the central management, guidance, and coordination of all EIA activities. The Administrator of EIA is supported by a Deputy Administrator, an immediate staff, and the Office of Planning and Resources (OPR). OPR manages overall EIA program planning and evaluation, project control, budgeting, and procurement; performs organization and management analysis; and provides personnel management and logistical support services. The Office also monitors and coordinates all General Accounting Office and Professional Audit Review Team activities, tracks legislation for energy information implications, prepares and coordinates Congressional testimony, and handles the disclosure of sensitive company-submitted information.

II. Summary Table

Program Activity	FY 1986	FY 1987	FY 1988	% Change
Program Support	$ 441	$ 322	$ 173	-46.3
Program Direction [1]	7,032	10,001	10,052	+ 0.5
Total, Policy and Management	$7,473	$10,323	$10,225	- 0.9

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[1] Includes functional transfer to National Energy Information System for ADP supplies--$250 in FY 1986, $200 in FY 1987, and $200 in FY 1988.

III. Activity Descriptions

Program Activity	FY 1986	FY 1987	FY 1988
Program Support	Develop EIA annual and multi-year program and contract plans. Prepare budgets and related testimony and hearing materials. Execute budget. Process and monitor contract, personnel, and other administrative support actions. Operate and maintain automated resource management system. ($441)	Continue FY 1986 activities with reduction in planning activities. Cancel some planned improvements to automated resource management system. ($322)	Continue FY 1987 activities with change from award fee contracts to cost plus fixed fee contracts, negating the need to fund separate fees at the time of contract award. ($173)
Program Direction	Provide funds for salaries, benefits, and travel for Policy and Management staff. Provide funds for all EIA staff training. Provide administrative support to Dallas Field Office. Provide funds to Department for space rental, utilities, communications, supplies, and other support services. ($7,032)	Continuation of funding for Policy and Management salaries, benefits, and travel, EIA training, and support to Dallas Field Office. Increased funding for Departmental administrative support funding (primarily rent and telephones). ($10,001)	Continuation of FY 1987 activities. Decrease (after inflation) largely due to DOE/Defense Programs assuming responsibility for guard services funding beginning in FY 1988. ($10,052)
POLICY AND MANAGEMENT TOTALS	$7,473	$10,323	$10,225

DEPARTMENT OF ENERGY
FY 1988 CONGRESSIONAL BUDGET REQUEST
ENERGY INFORMATION ADMINISTRATION
(dollars in thousands)

ANALYSIS OF BUDGET BY OBJECT CLASS

Policy and Management

Direct Obligations	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
Personnel Compensation:			
11.1 Full-time permanent..............	$ 1,305	$ 1,237	$ 1,262
11.3 Other than full-time permanent......................	33	34	34
11.5 Other personnel compensation.....	9	18	18
11.9 Total personnel compensation.....	1,347	1,289	1,314
12.1 Personnel benefits, civilian.....	136	172	214
21.0 Travel and transportation of persons........................	33	33	34
22.0 Transportation of things.........	87	129	124
23.1 Rental Payments to GSA...........	1,988	3,337	4,044
23.2 Communications, utilities, and other rent......................	1,318	2,343	2,042
24.0 Printing and reproduction........	647	1,035	983
25.0 Other services..................	1,284	1,660	1,288
26.0 Supplies and materials...........	192	325	182
99.0 Subtotal, Direct Obligations.....	$ 7,032	$ 10,323	$ 10,225

DEPARTMENT OF ENERGY
FY 1988 OMB Request
ENERGY INFORMATION ADMINISTRATION
(dollars in thousands)

ANALYSIS OF BUDGET BY OBJECT CLASS

Policy and Management

Reimbursable Obligations	FY 1986 Actual	FY 1987 Estimate	FY 1988 Estimate
22.0 Transportation of Things	$ 0	$ 0	$ 5
23.1 Rental Payments to GSA...........	100	100	115
23.2 Communications, utilities, and other rent..................	70	71	81
24.0 Printing and reproduction........	39	40	40
25.0 Other services..................	48	46	45
26.0 Supplies and materials..........	23	23	38
99.0 Subtotal, Reimbursable Obligations....................	280	280	324
99.9 Total Obligations................	$ 7,312	$ 10,603	$ 10,549

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